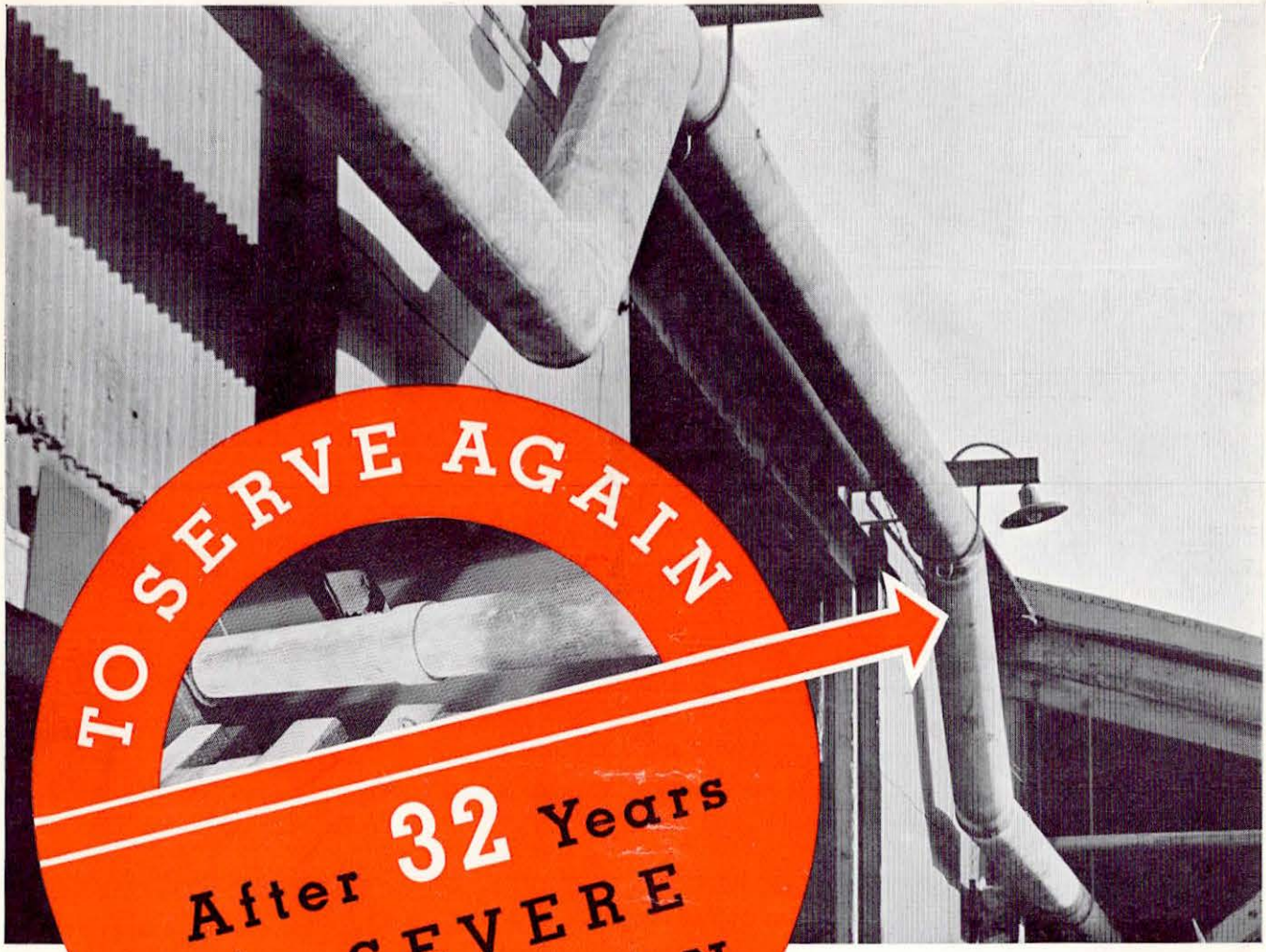
McCARTNEY LIBRARY
GENEVA COLLEGE

AUGUST 8, 1936

Railway Age

Founded in 1856



WROUGHT iron often outlives its original assignment — even under severe corrosive conditions.

For 32 years this 10" galvanized wrought iron pipe had served as a fire line under Hoboken Piers No. 3 and No. 4 of the D. L. & W. R. R. where it was constantly exposed to salt air, spray and water. Recently the engineers decided to replace the old lines with new ones located overhead. But — examination revealed that the old line was in excellent condition and, therefore, it was reinstalled — thus saving the cost of new pipe.

Many other instances of wrought iron's long and economical life under various corrosive conditions are in our files. This data is an unfailing guide in the selection of the most suitable materials for resisting each type of corrosion. And, if you wish aid in analyzing corrosive conditions, our trained field and laboratory staffs are at your service.

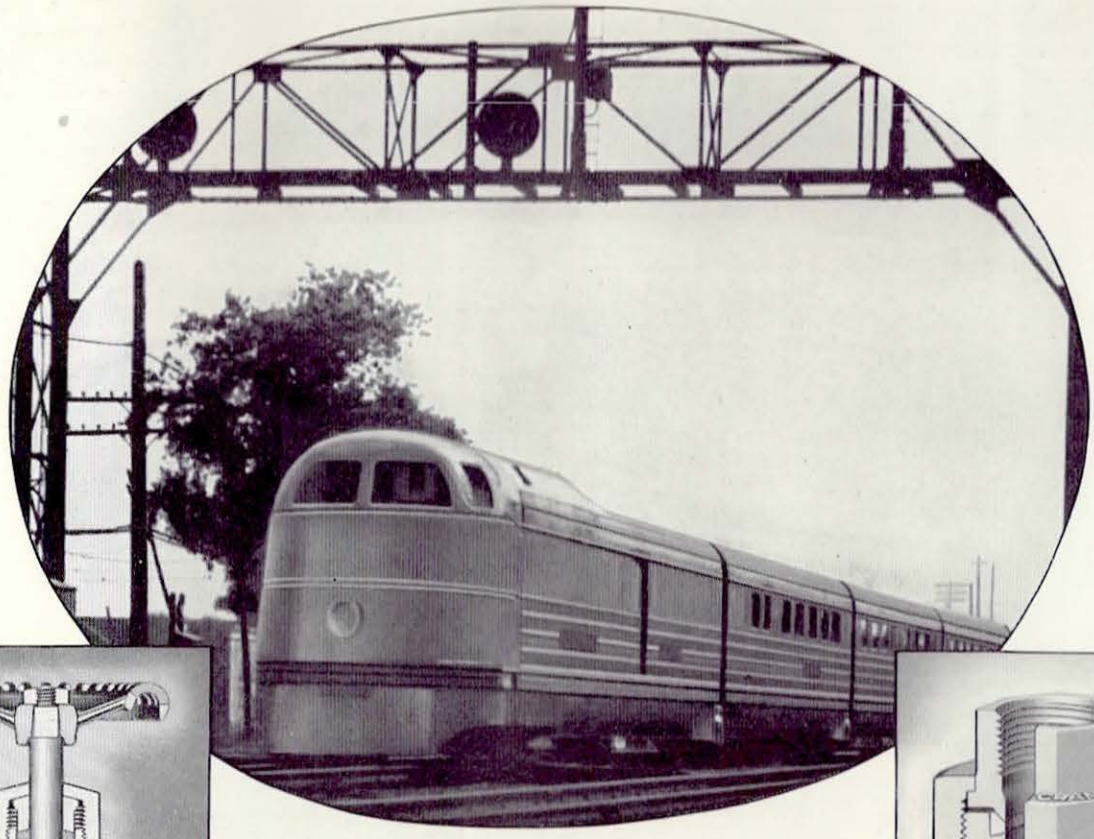
Tell us the type and location of your equipment — tanks, smokestacks, refrigeration systems, underground, rolling stock or building piping. Write our Engineering Service Department or our nearest Division Office, and by all means request a copy of the engineering report entitled "The Use of Wrought Iron in Salt Water Service." A. M. Byers Co., Est. 1864. Pittsburgh, Boston, New York, Washington, Chicago, St. Louis, Houston.

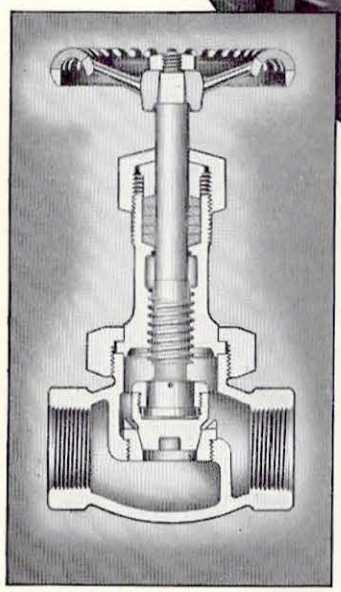
BYERS

GENUINE WROUGHT IRON PRODUCTS

PIPE · WELDING FITTINGS · RIVETS · SPECIAL BENDING PIPE · O. D. TUBES
PLATES · SHEETS · CULVERTS · FORGING BILLETS · STRUCTURALS · BAR IRON

Specify Byers Genuine Wrought Iron Pipe for your corrosive services and Byers Steel Pipe for your other requirements



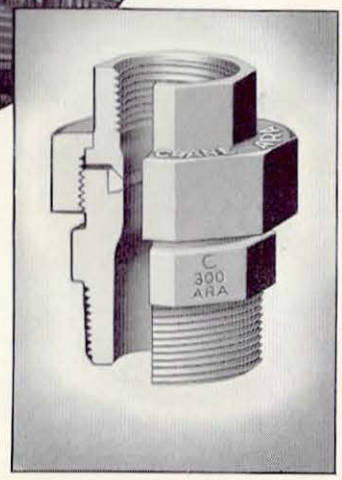


Crane A.A.R. Globe Valve

THINGS THAT COUNT IN RAILROAD PIPING

● Crane A. A. R. Globe, Angle and Turret Valves and A. A. R. Union and Union Fittings embody all that precision of workmanship, quality of materials, and rigid inspection that can be found only in Crane products. These things make a big difference in ease of installation, performance and service life.

In addition, Crane Co. offers a piping service which helps you make locomotive and shop piping installations at lower cost, in less time, with fewer joints and in smaller space. The Crane branch near you is fully qualified to render this service. Ask for it.



Crane A.A.R. Reducing Air Pump Union described and listed on page 240, new Crane No. 52 Catalog

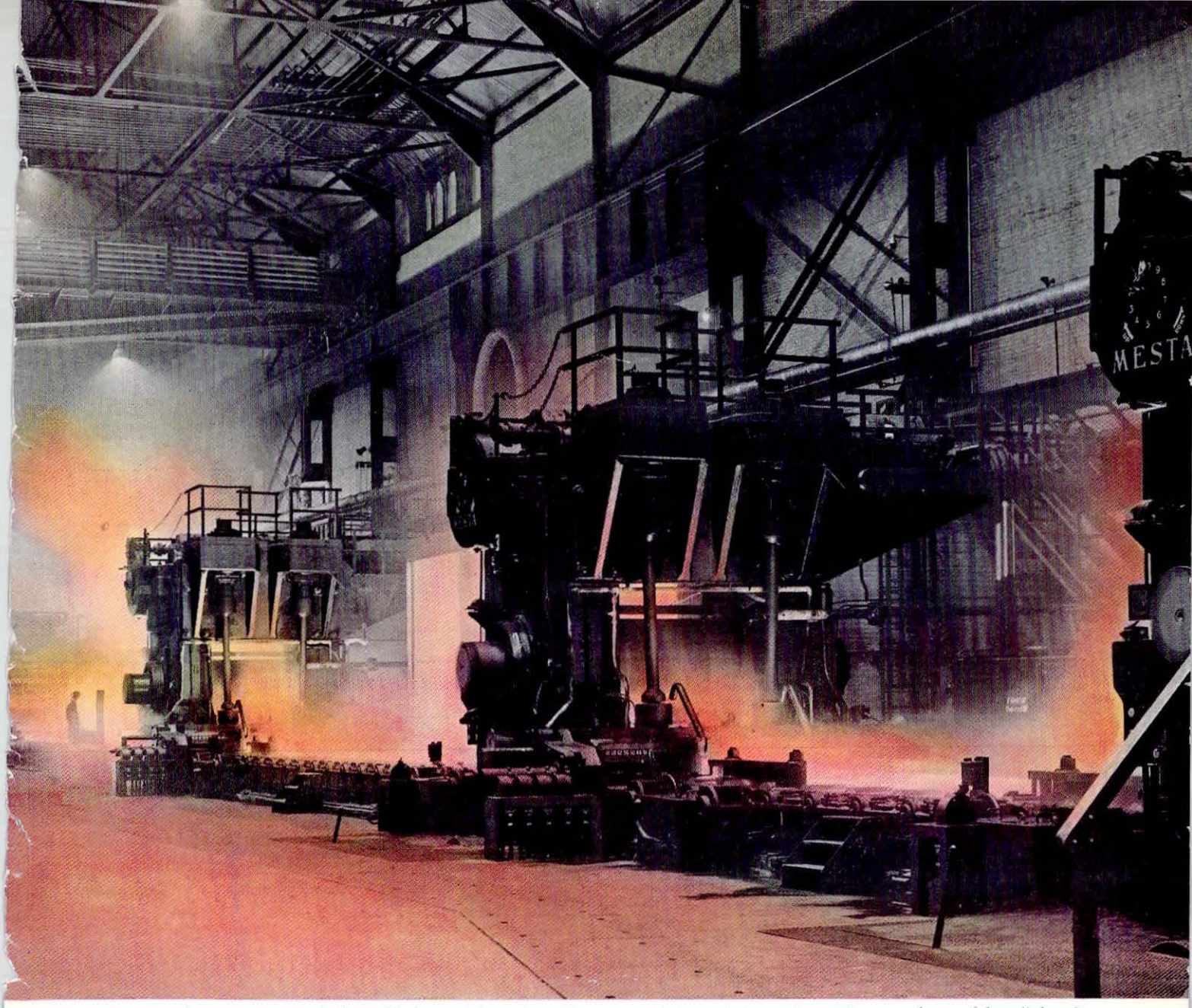
CRANE

CRANE CO., GENERAL OFFICES: 836 SOUTH MICHIGAN AVE., CHICAGO, ILL. • NEW YORK: 23 W. 44TH STREET

Branches and Sales Offices in One Hundred and Sixty Cities

RAILROAD VALVES, FITTINGS AND PLUMBING FIXTURES

Published weekly by Simmons-Boardman Publishing Company, 1309 Noble Street, Philadelphia, Pa. Entered as second class matter January 4, 1933, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.



A new continuous strip-sheet and plate mill places Bethlehem in position to meet the increasingly exacting requirements of users of flat-rolled steel.

Always an eye to trends in steel consumption

A SALIENT characteristic of Bethlehem's history as a steel producer is a record of moving boldly to provide the facilities needed to meet new trends in steel consumption.

Back in the '80s Bethlehem installed huge presses and hammers that placed the company in a leading position in the manufacture of heavy steel forgings, then just coming into wide use.

In 1907—year of panic—Bethlehem opened a great new mill for the making of an entirely new product—the wide-flange structural shapes which placed Bethlehem in the forefront as a producer of structural steel.

A dozen years ago an elaborate installation of continuous and semi-continuous bar mills gave Bethlehem a prominent position in the manufacture of bars and special sections.

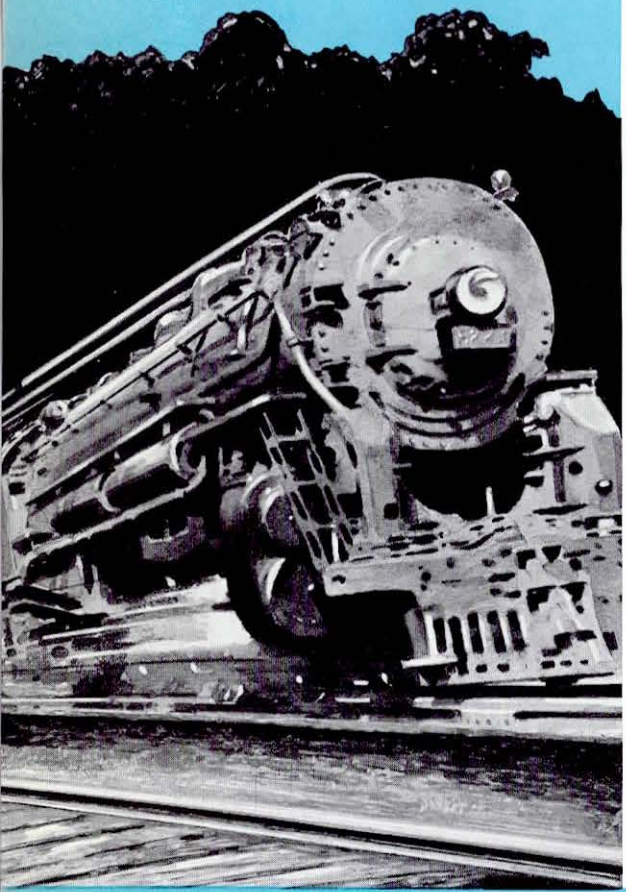
Now, as the demand for flat-rolled steel increases by leaps and bounds, Bethlehem is ready with a great new continuous strip-sheet mill. In this mill, with an annual capacity of 600,000 tons, all possible refinements for both hot-rolled and cold-rolled sheets and strip for which there is any commercial demand are provided.

By keeping an alert eye on trends Bethlehem consistently meets new requirements of steel-consuming industries with facilities to supply steel in the forms needed.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

Steel Products for Railways



PLATES — CARBON OR ALLOY STEEL

BETHLEHEM's plate-making skill has shown up particularly in the manufacture of nickel-steel boiler and firebox plates to meet the exacting requirements of the service in respect to both fabricating qualities and serviceability.

Whatever service conditions may be involved, whatever properties, physical or chemical, may be called for, Bethlehem has the men, the facilities and the experience that assure steel plates that measure up to all demands.

HEADS AND OTHER FLANGED PRODUCTS

LET Bethlehem supply your needs in the line of tank heads, boiler heads, dome sheets, manheads, yokes, saddles and miscellaneous flanged plate work.

The location of the Bethlehem Flanging Shop, with the plate mills and open-hearth furnaces of a large steel mill right at hand, makes it possible to fill large or small orders in any grade of steel with great speed.

CARBON STEEL BARS

IN making carbon steel bars Bethlehem pays special attention to the properties that make for high machinability, response to heat-treatment, and complete reliability.

ALLOY STEELS

MAYARI Engine Bolt Steel, Mayari Staybolt Steel, Silico-Manganese Spring Steel, Mayari Superheater Bolt Steel. Alloy Steel forging billets for heavy forgings.

A FULL RANGE OF STRUCTURAL SHAPES

BETHLEHEM Steel Company mills roll structural shapes for all the many uses in railway structures and equipment.

Bethlehem's complete range of structural shapes extends from 36-in. I-beams for single-span bridges down to the smallest angles.

TRACK BOLTS AND SPIKES

BETHLEHEM makes bolts, nuts and related products for every railway requirement. Hot-forged nuts, track bolts, frog bolts, engine bolts, staybolts and super-heater bolts. Corrosion-resisting bolts, track spikes, turnbuckles, and many special items.

TRACK SPECIALTIES

FROGS and Switches, Switch Stands, Guard Rails, Gage Rods, Rail Anchors, and related equipment. Special Track Layouts.

BRIDGES OF ALL TYPES

BUILDINGS

STEEL frame buildings of all descriptions.

WROUGHT-STEEL WHEELS

THE forging and rolling processes of manufacture give these wheels abundant strength and stamina for today's higher speeds. They can be furnished in the heat-treated condition.

BOILER TUBES

GENUINE old-fashioned charcoal-iron boiler tubes; double-pass steel tubes. Double-pass copper-bearing steel tubes.

BETH-CU-LOY SHEETS TO RESIST THE WEATHER

FOR roofing, siding and other uses where sheets are exposed to the weather, Beth-Cu-Loy is the ideal material. Beth-Cu-Loy Sheets are made of copper-bearing steel, the material which, impartial tests have shown, outlasts by two to two and one-half times steel made without the copper.

Other Bethlehem Products for Railways

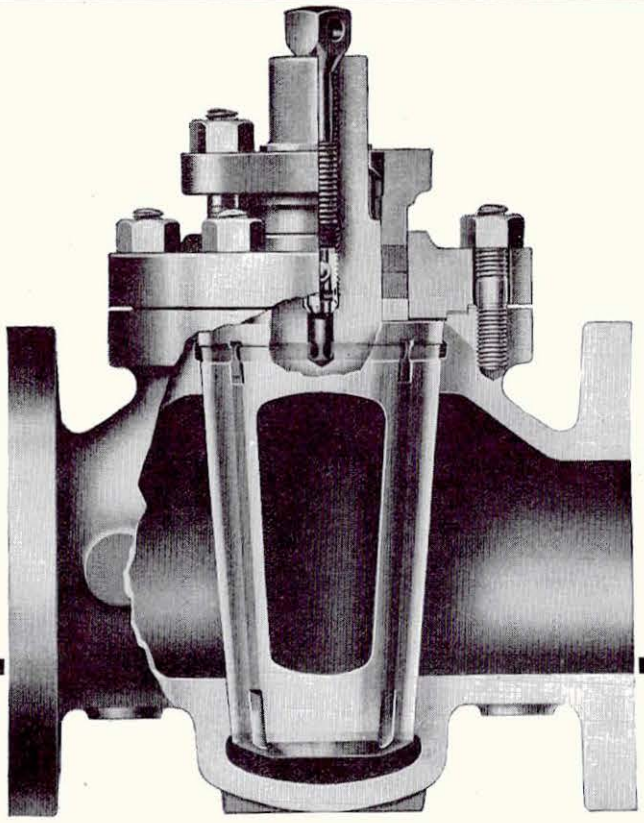
RAILS and Accessories, Steel Freight and Passenger Cars, Tool Steels, Alloy Steels, Forged Steel Axles, Steel H-Piling, Steel Pipe, Castings, Forgings, Wire and Wire Products, including bethanized fence for extra-long life in corrosive atmospheres.

BETHLEHEM STEEL COMPANY, *General Offices:* Bethlehem, Pa. *District Offices:* Albany, Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Hartford, Honolulu, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New York, Philadelphia, Pittsburgh, Portland, Ore., Salt Lake City, San Antonio, San Francisco, St. Louis, St. Paul, Seattle, Syracuse, Washington, Wilkes-Barre, York. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

VALVES ARE MACHINES!

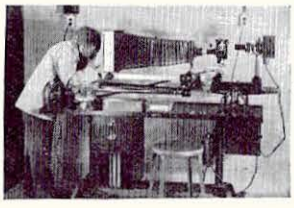


This valve provides full direct port opening with one-quarter turn and a positive dead-tight shut-off

Like all machines, valves are subject to wear on the moving parts. But, with a minimum number of working parts, rugged construction, and, above all, a simple perfect means of lubrication, friction is reduced to a negligible item in Walworth Lubricated Plug Valves.

Wherever leaks would be costly or dangerous, Walworth Lubricated Plug Valves will give long, dependable service at lowest possible operating cost. Whether the service calls for the handling of acids . . . solvents . . . gasoline . . . or other "difficult" liquids . . . there is a Walworth Lubricated Plug Valve and its corresponding lubricant for each duty.

Walworth makes a *complete* line of types and sizes. Send for Catalog No. 4.



PRE-PROVING WALWORTH QUALITY

This metallurgical microscope discloses and records the internal structure of metals, thus providing a check on the quality of product . . . in the forged state . . . after heat treatment . . . after subjection to service . . . or any simulated service condition.

This microscope is another of the many devices with which Walworth predicts the uniform high quality of its products. Field performance finds Walworth quality unsurpassed.

WALWORTH

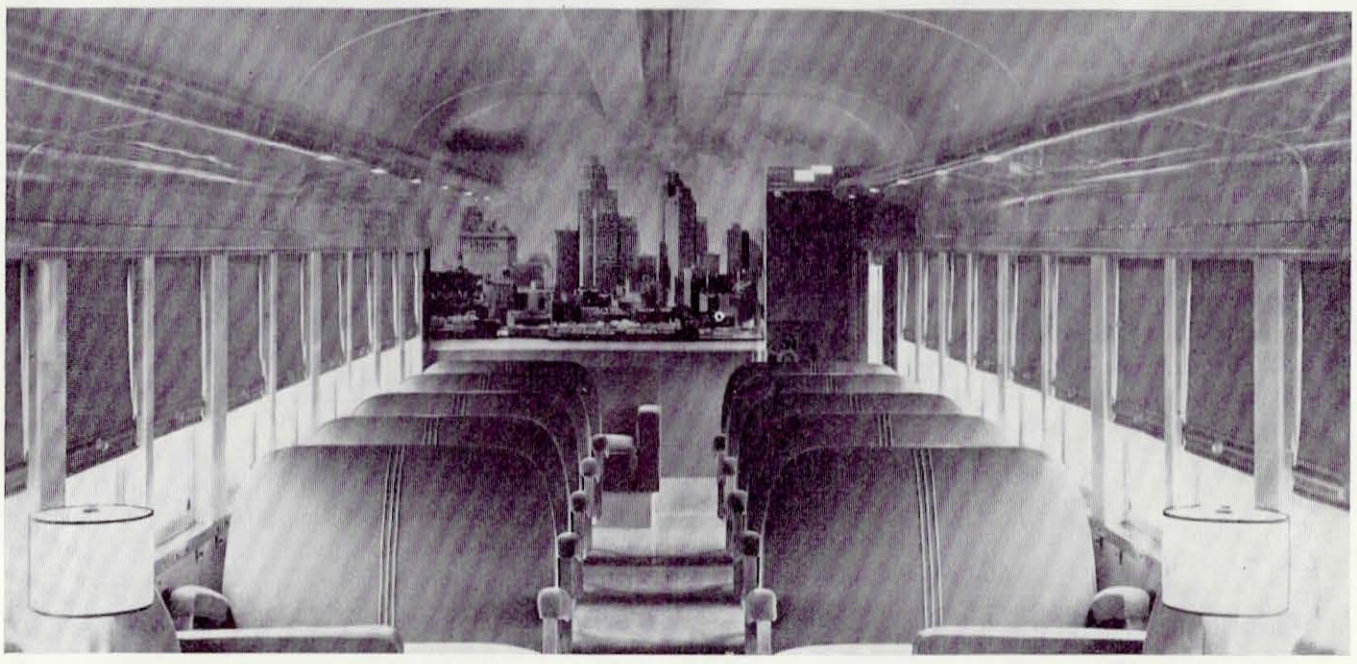
WALWORTH COMPANY
60 EAST 42nd STREET, NEW YORK

VALVES FITTINGS and TOOLS
Backed by 94 Years' Service

DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

THE MERCURY

UPHOLSTERS IN A PROVEN TRAVEL FABRIC OF THE FUTURE



Velmo-upholstered coach seats, by Coach & Car Equipment Co. Parlor car chairs by S. Karpen & Bros. Lounge car seats by Lincoln Chair Co. Designer, Henry Dreyfuss.

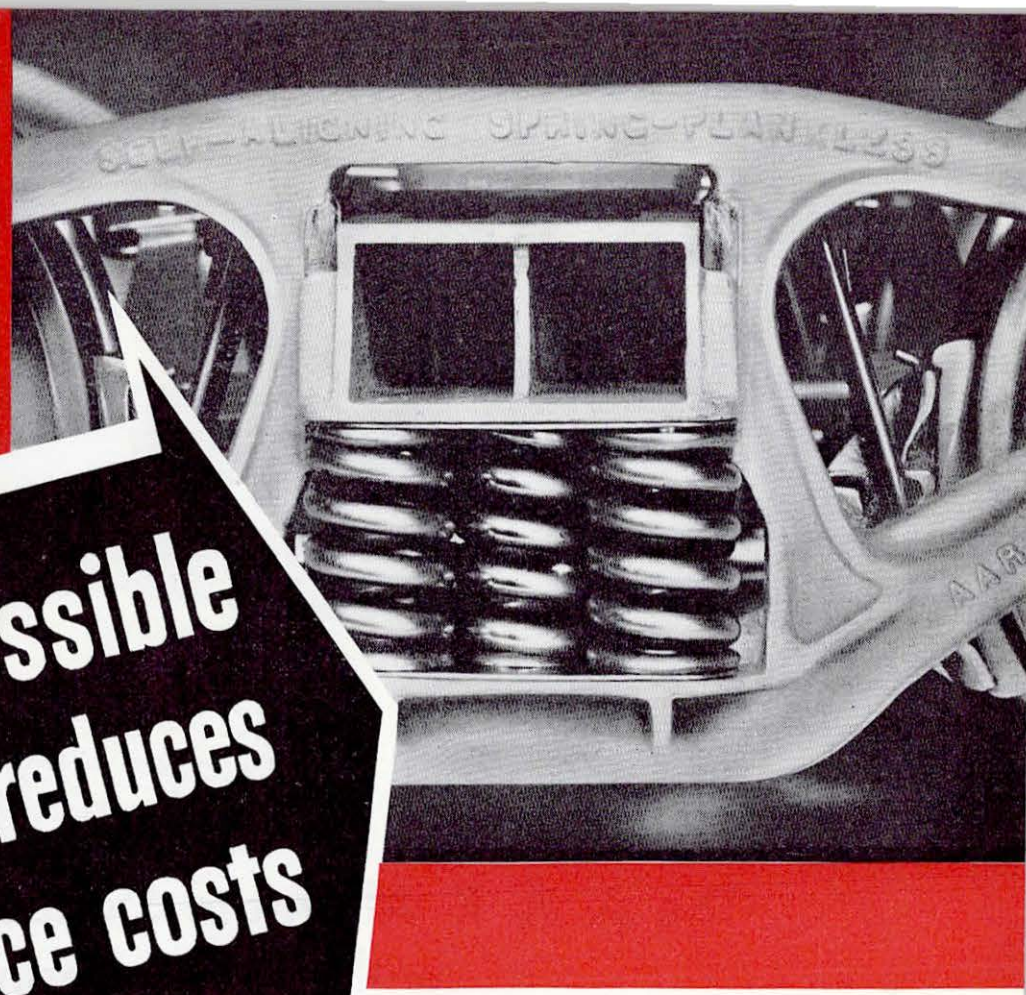
AGAIN IT'S VELMO...chosen by a foremost industrial designer, Henry Dreyfuss...for America's latest streamliner, N. Y. Central's Mercury. *Velmo* for its 50 years of proved durability. *Velmo* for its beauty of texture and weave, always a "trend" ahead of the times. Plenty of "road histories" are at your disposal; ask Chase about the mohair velvet that is "Good to the Last Mile!"

VELMO

MOHAIR VELVET

A GOODALL-SANFORD PRODUCT

L. C. CHASE & COMPANY, INC.
selling division of Goodall-Sanford
295 Fifth Avenue, New York
Boston • Chicago • Detroit • San Francisco

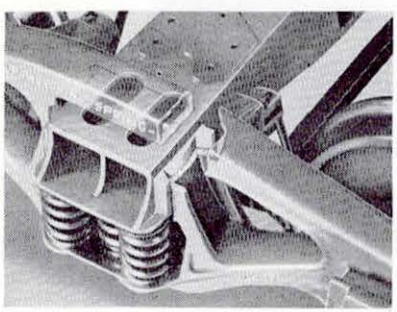


This accessible spring seat reduces maintenance costs

Springs of the Self-Aligning (spring-plankless) Truck are easy to inspect . . . easy to remove . . . easy to shim . . . whether they be all coil, "Coil-Elliptic", coil-snubber combination or any other desired arrangement.

The wide, one-level spring seat permits a balanced symmetrical arrangement . . . producing uniform spring loading. Large flat bolster bearings afford spring resistance to angularity and also aid in the restoration of proper alignment.

These features are important factors in the low maintenance costs of Self-Aligning Trucks.



The wide cylindrical surfaces at the point of contact between bolster and side frame insure long wear . . . and low maintenance costs.

THE BUCKEYE STEEL CASTINGS CO.

NEW YORK • COLUMBUS, OHIO • CHICAGO

Licensed Manufacturer of Self-Aligning Trucks

SELF-ALIGNING TRUCKS

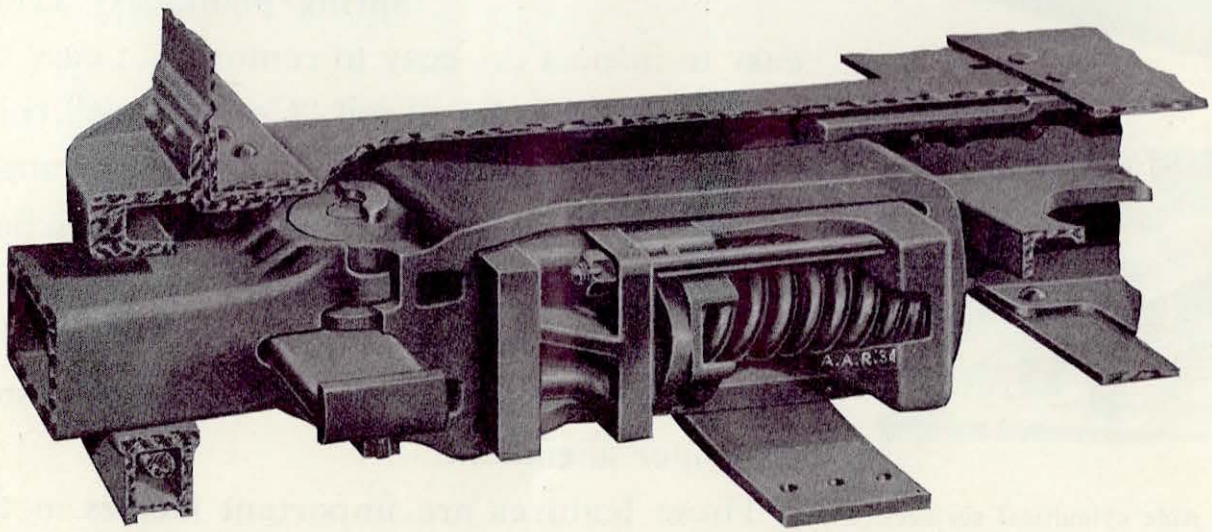
spring-plankless double-truss

UTILIZE DESIGNS OF PROVED DEPENDABILITY

Reduce Railroad Operating Costs

The A. A. R. Alternate Standard E Coupler with Swivel Shank

Angles without reduction of bearing area in buff or pull
Eliminates Deformation and Wear of Butt and Key
REDUCES Coupler and Attachment REPAIR EXPENSE



Ideal, Compact Application with A. A. R. Certified M-17-A. Draft Gear

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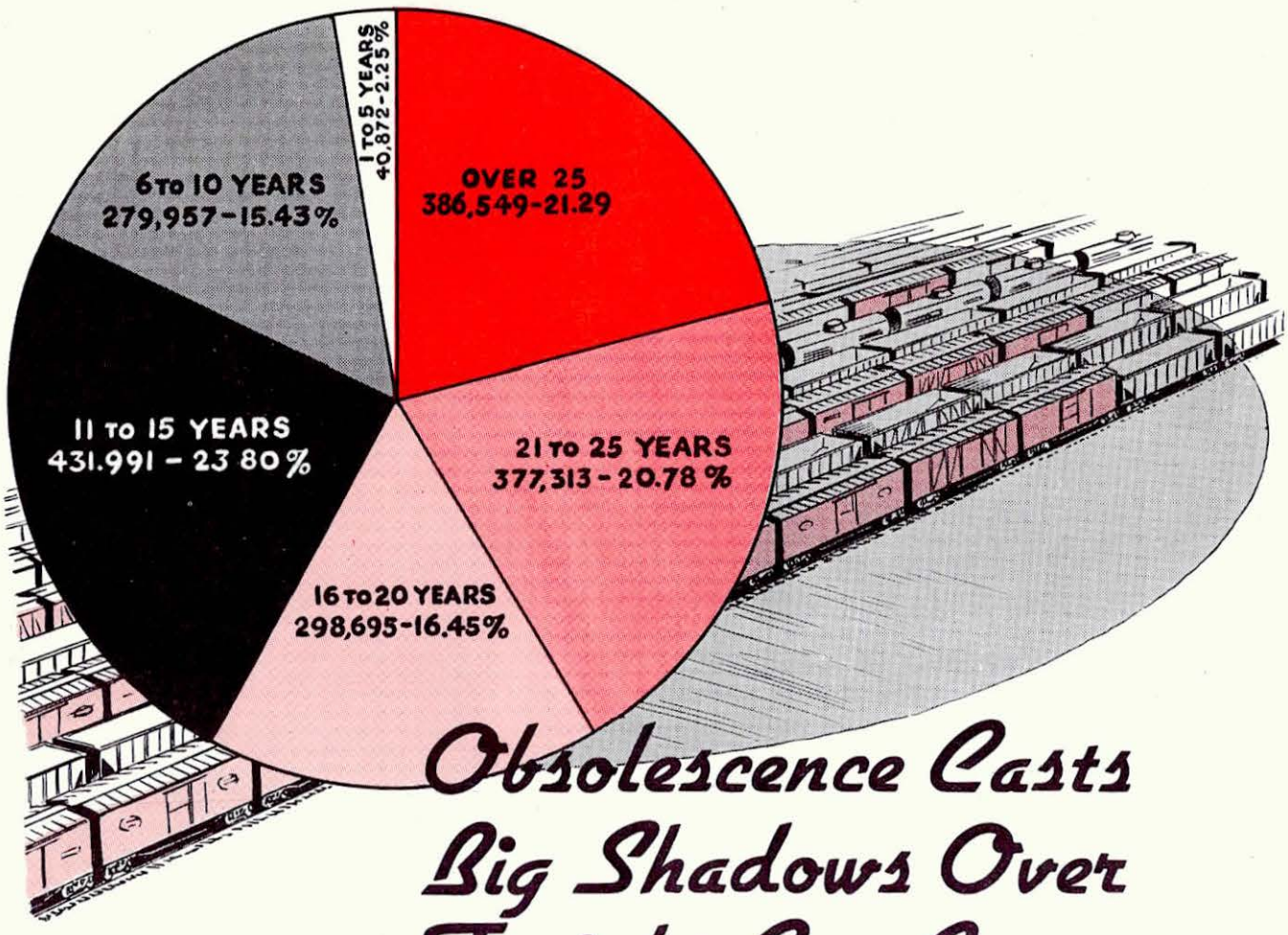
NATIONAL MALLEABLE AND STEEL CASTINGS CO.

General Office—Cleveland, Ohio

Sales Offices: New York • Philadelphia • Chicago • St. Louis • San Francisco
Works: Cleveland • Chicago • Indianapolis • Sharon, Pa. • Melrose Park, Ill.



Obsolescence Casts Big Shadows Over Freight Car Inventory

"CLASS I Railroads during the past six years in retiring 588,000 freight cars have recognized the advisability of scrapping equipment of obsolete construction which is expensive to maintain. There are, however, still in existence as of December 31, 1935, on Class I Railroads about 760,000 cars more than 20 years old which, generally speaking, are uneconomical to operate and maintain and should be retired and, so far as additional equipment may be necessary, replaced with cars of the latest design.***

"A small proportion of the retired cars have been replaced, due not only to the financial condition of the railroads resulting from the depression, but also because of decreased traffic requirements during the last few years resulting in a reduction in ownership of freight cars from 2,277,000 at the end of 1929 to about 1,833,000 at the end of 1935, or a net decrease in ownership of 444,000 cars. Serviceable cars have shown an even greater shrinkage because of the large number that are set aside awaiting repairs. At the end of 1929 there were 119,000 cars held for repairs, whereas by the end of 1935 there were 267,000 set aside for this purpose, — an increase of 148,000.

"Thus at the end of 1935 Class I Railroads owned about 1,566,000 serviceable freight cars, — a reduction of 592,000 from 1929."

The above are excerpts from report dated March 10, 1936 by Coverdale & Colpitts on the "Economic Aspects of the Freight Car Situation."

American Railway Car Institute

19 Rector Street New York, N. Y.

PERFORMANCE on thousands of miles of track, has proved the enduring value of AmCreCo products which, at minimum cost, provide durability, long term economy and profits in the form of low annual cost for track and structures. More than 30 years of leadership in the wood preserving field assure a high standard of uniform quality in AmCreCo ties, poles, piles and timbers.

AMERICAN CREOSOTING COMPANY

INCORPORATED

COLONIAL CREOSOTING COMPANY INCORPORATED

AMCRECO LOWRY PROCESS CREOSOTED WOOD

GEORGIA CREOSOTING COMPANY INCORPORATED

LOUISVILLE — KENTUCKY

With a potential yearly capacity of 200,000 tons the position of the AMERICAN STEEL FOUNDRIES in the steel casting industry has been well known for many years.

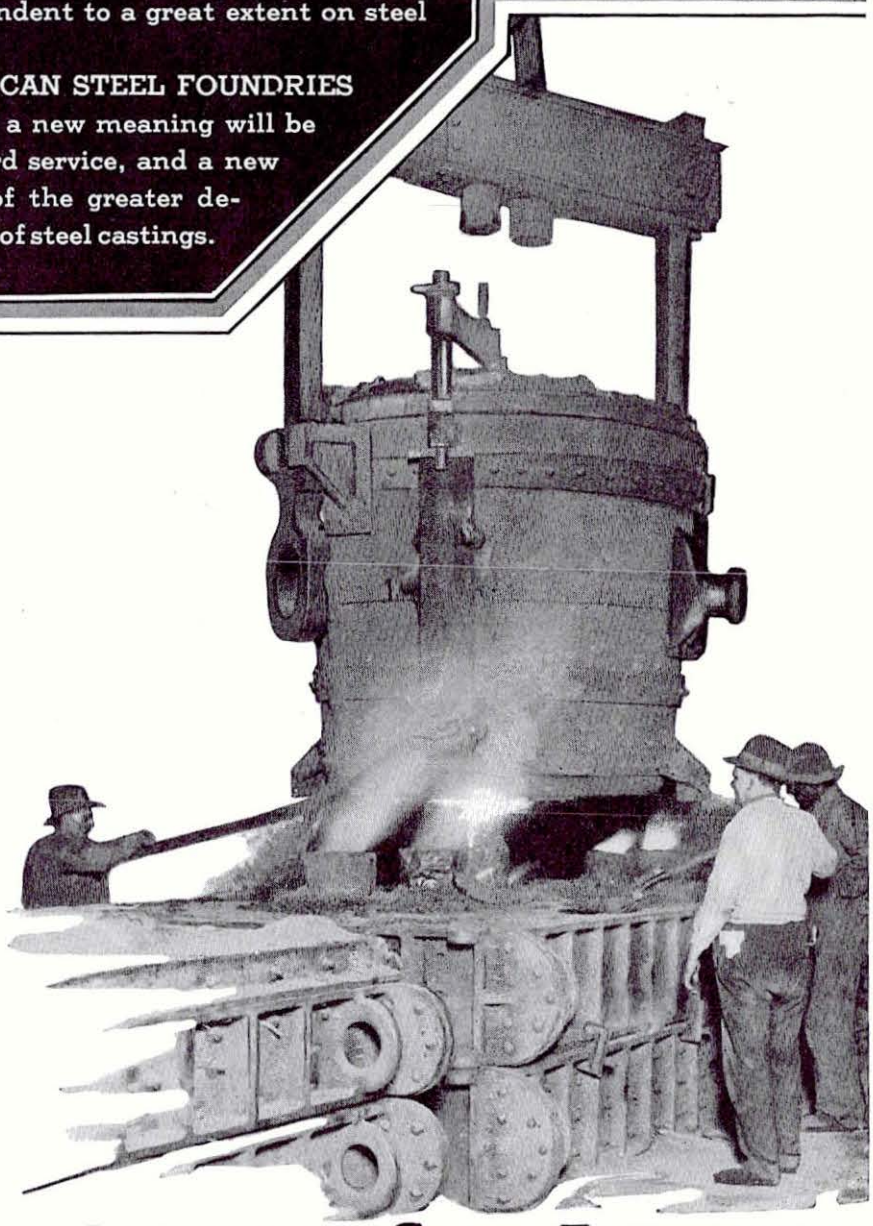
With its wealth of organization, engineering ability and resources, it has been a pioneer and leader in the advancement of methods and processes for the production of quality steel castings.

Lightness, strength, purity, homogeneity and ability to resist shock and torsional strains, characterize steel castings and explain why they have been adapted so extensively by manufacturers of agricultural, mining, tractor, railroad and other equipment. The three basic industries, preparation of food, clothing and transportation, around which all others revolve, are dependent to a great extent on steel castings.

In the use of AMERICAN STEEL FOUNDRIES cast steel products a new meaning will be given to the word service, and a new idea gained of the greater dependability of steel castings.

SPECIFY STEEL CASTINGS

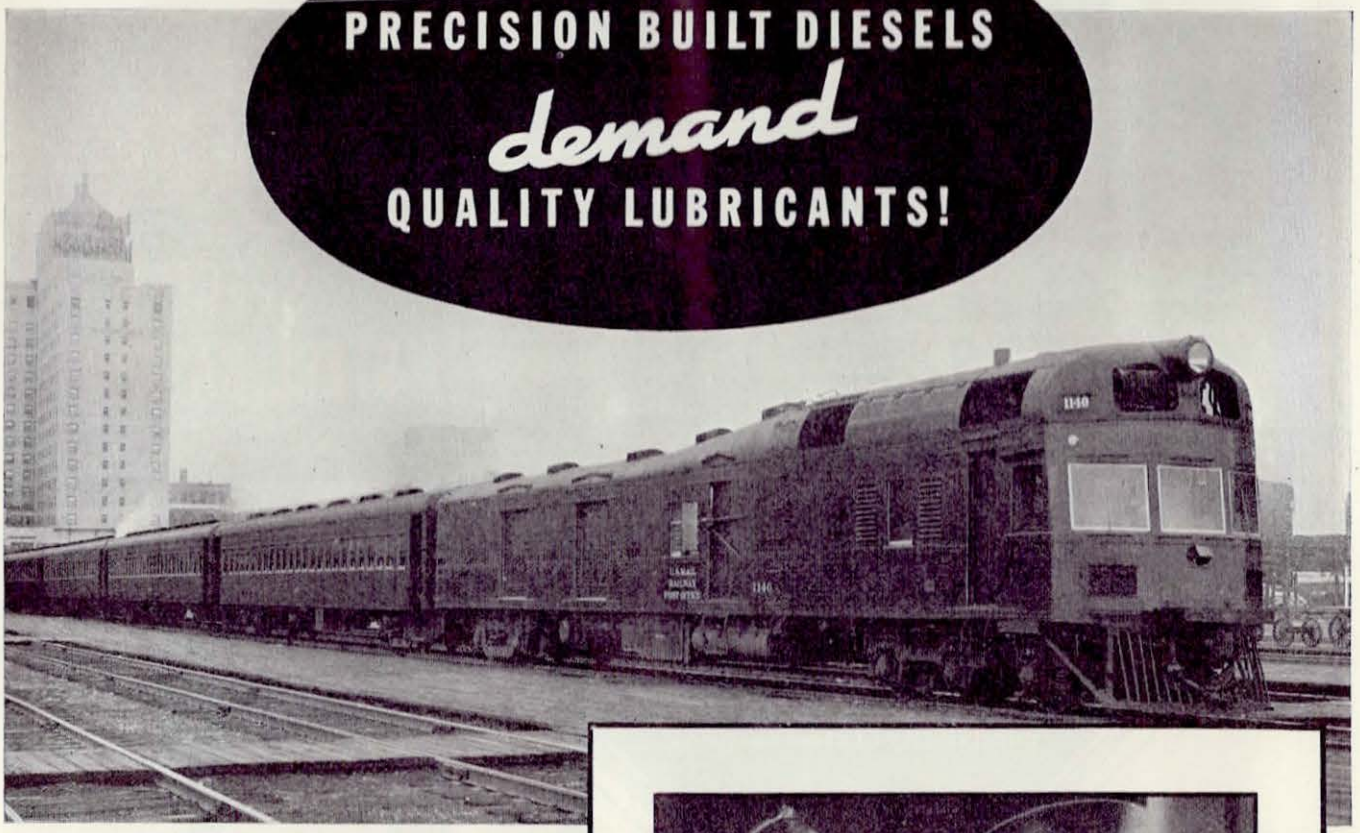
MANUFACTURERS AND ENGINEERS KNOW AND TRUST THEM



AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

PRECISION BUILT DIESELS *demand* QUALITY LUBRICANTS!



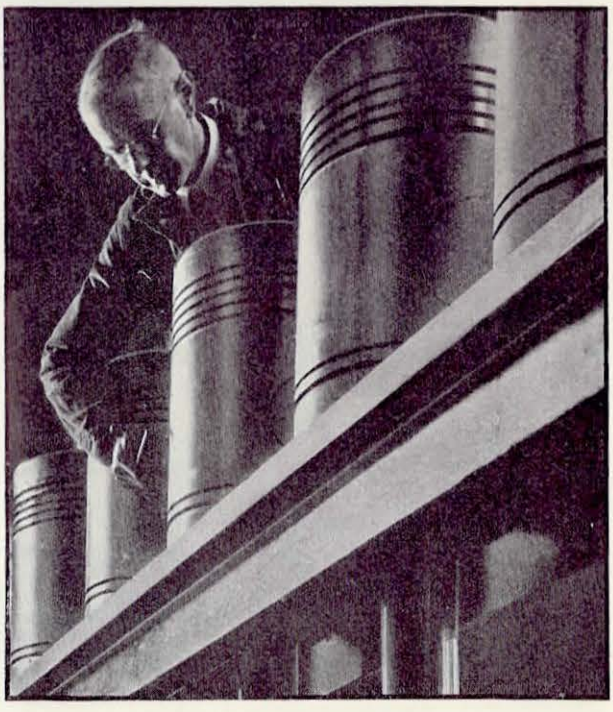
FIFTY LEADING BUILDERS of Diesel engines in the U. S. have tested Gulf lubricants and placed their stamp of approval on them!

That is a significant fact. For the modern Diesel engine is precision built—and the manufacturer recognizes the importance of proper lubrication in its economical operation.

Gulf Diesel lubricants go beyond specifications. The best known processes of refining make Gulf Diesel oils the most efficient and economical you can use.

If you are not using Gulf lubricants, we suggest that you discuss the matter of lubrication with a Gulf representative who will recommend the right lubricants for your equipment. This safety measure will help you secure lowest maintenance costs for your Diesels.

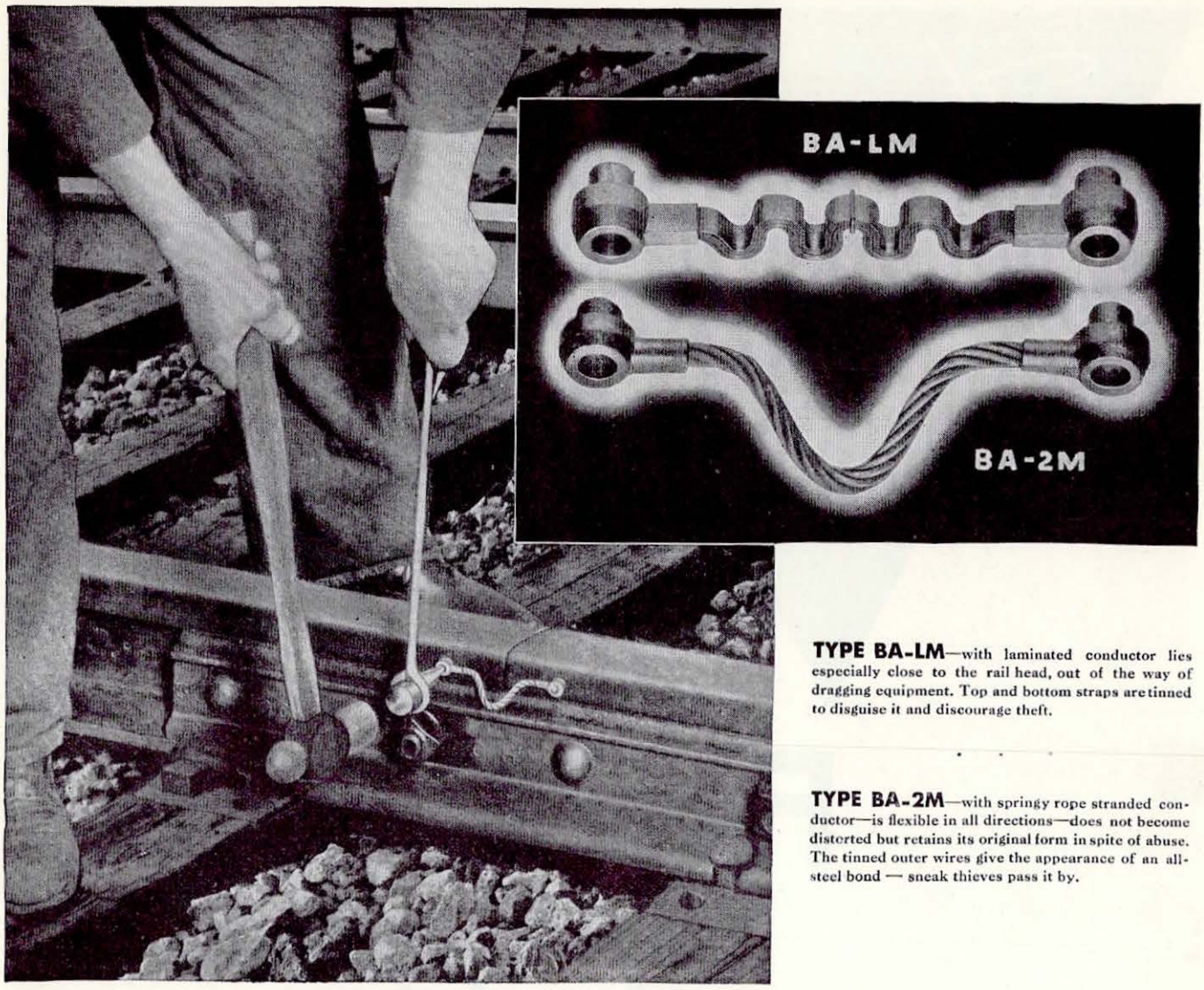
GULF INDUSTRIAL LUBRICATION



The picture above, taken in the plant of a leading Diesel builder, shows the inspection of pistons and connecting rods after a new engine has been given a test run. All pistons must set perfectly and ride without wear in their respective cylinders. Gulf Diesel lubricants provide a tough protective film which insures minimum wear.

GULF OIL CORPORATION ★ GULF REFINING COMPANY

GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PENNSYLVANIA



TYPE BA-LM—with laminated conductor lies especially close to the rail head, out of the way of dragging equipment. Top and bottom straps are tinned to disguise it and discourage theft.

TYPE BA-2M—with springy rope stranded conductor—is flexible in all directions—does not become distorted but retains its original form in spite of abuse. The tinned outer wires give the appearance of an all-steel bond — sneak thieves pass it by.

Easy . . . simple . . . and SAFE to install

TO prove this, just watch a workman attach one of these new Tigerweld Bonds.

He merely drills two ⅜" holes one quarter of an inch deep and 3⅞" apart on adjoining rail heads — fits the terminal plugs in the holes — inserts the long handle punch into the terminal head—gives it three or four smart blows with an ordinary four pound hammer and the bond is attached — tight and firm to stay. There's easy, permanent, safe installation for you! The long handled punch permits a clean, full blow of the hammer — keeps the worker's hands safely out of the way.

In addition to this unusual safety, these new Signal Bonds incorporate other features that have made all Tigerweld Bonds outstanding in efficiency and economy. The husky stud type terminals of solid steel have the same coefficient of expansion as the steel rail, another assurance of permanency. They are flash butt-welded to the bronze conductor, making a union between terminal and conductor stronger than the conductor itself.

Remember — every Tigerweld Bond is proof tested before it leaves the factory. The conductor is of bronze, abuse proof, highly resistant to fatigue, lasting in service. For full particulars, for samples and prices, write us.

TIGERWELD SIGNAL BONDS

Flash Butt-Welded . . . Stud Type

AMERICAN STEEL & WIRE COMPANY

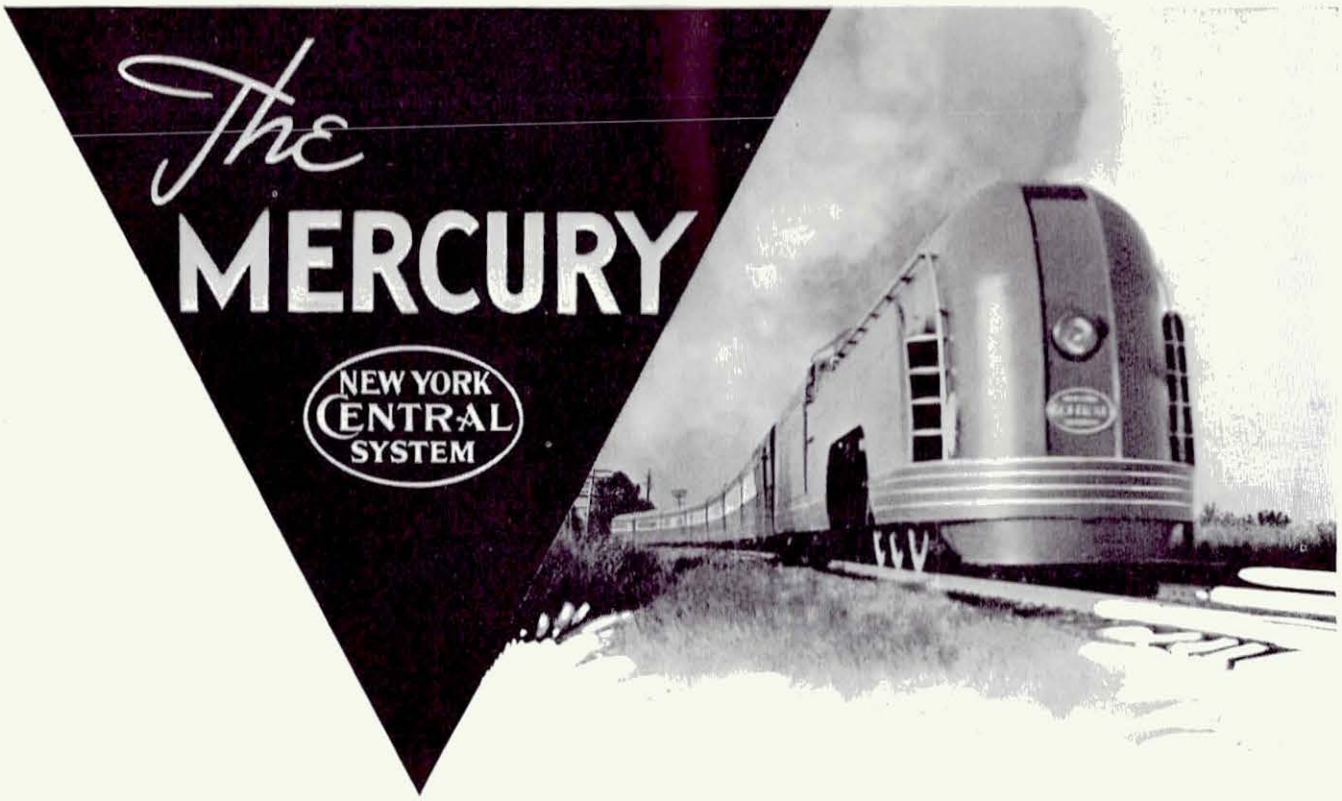
208 S. La Salle Street, Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

Empire State Building, New York

United States Steel Products Company, New York *Export Distributors*

UNITED STATES STEEL



FIREBAR
Equipped

THE New York Central's new modern train "The Mercury" has its locomotive FIREBAR Equipped to insure BETTER FIRES.

Over 1000 locomotives on the New York Central System are now FIREBAR equipped.

WAUGH FIREBAR
BETTER FIRES

FIREBAR DIVISION
OF THE
WAUGH EQUIPMENT COMPANY
New York Chicago St. Louis
Canadian Waugh Equipment Company, Montreal, Que.

DO YOU KNOW THAT YOU PAY FOR CREOSOTE WHETHER YOU USE IT OR NOT?

Koppers helps Railroads to save money in many ways!

You pay MORE for *not* using creosote than for using it. You pay in renewals of decayed timber and in extra labor costs for replacements.

One railroad system with lines in eight states recently compiled an experience-record on experimental ties. The figures showed that ties treated with creosote lasted nearly five times as long as untreated ties, six years longer on an average than ties treated with a mixture of creosote and another material, and nine years longer on an average than ties treated with a non-creosote preservative.

You pay for creosote whether you use it or not . . . USE IT.

KOPPERS PRODUCTS AND WHERE THEY APPLY IN THE RAILROAD FIELD	ROOFING MATERIALS	WATERPROOFING	ROAD TARS	CREOSOTE	LUMINO PAINT	LOCOMOTIVE FRONT END PAINT	BITUMINOUS PAINT	DISINFECTANTS INSECTICIDES
ROAD BEDS				✓				
LOCOMOTIVES						✓	✓	
STATIONS	✓	✓		✓				✓
SHOPS	✓	✓		✓	✓		✓	✓
BRIDGES		✓	✓	✓	✓		✓	
TUNNELS		✓	✓		✓			
DRIVEWAYS			✓					
POWER HOUSES	✓	✓		✓	✓		✓	
CONCRETE STRUCTURES		✓			✓		✓	
GRADE CROSSINGS			✓					
CATTLE PENS				✓				✓

KOPPERS PRODUCTS COMPANY
PITTSBURGH, PA.
Roofing, Waterproofing, Dampproofing, Creosote, Tarmac for Paving, Tar Base Paints

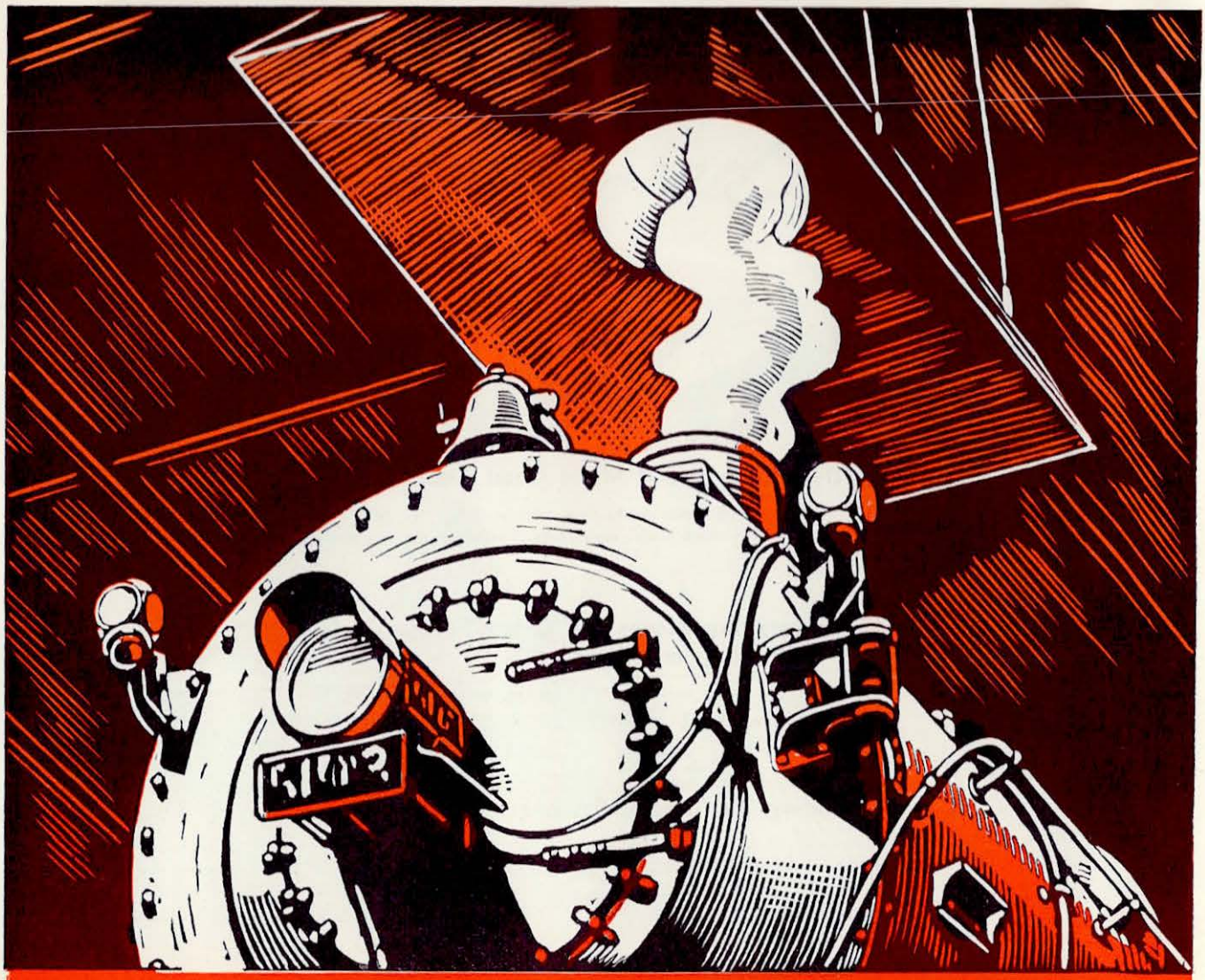
KOPPERS Creosote

Koppers Products Co., Pittsburgh, Pa.

Send me information on ☐ Roofing ☐ Waterproofing ☐ Road Tars ☐ Creosote ☐ Lumino Paint ☐ Front End Paint ☐ Bituminous Paints ☐ Disinfectants and Insecticides

Your Name.....Title.....

Address.....



These SMOKE JACKS will last for a long time

After a year's test of smoke jacks and ducts made of Toncan Iron, a large Eastern railroad ordered 35 tons of Toncan Iron plates for similar service. » » » Repeat orders based on exceptional performance are a splendid testimonial—and these Toncan Iron smoke jacks and ducts will deliver long, economical service. » » » Wherever sheet metal is subject to the action of sulphurous gases, high temperatures, cinder corrosion or moisture, there is no better material at the price than Toncan Iron. This alloy of refined open hearth iron, copper and molybdenum affords the highest rust-resistance of any ferrous material in its price class and also fabricates easily without loss of any of its initial characteristics. » » » Send for complete information. Address Department RA. » » » » » » » » » »

REPUBLIC STEEL

Republic Steel

CORPORATION

GENERAL OFFICES: CLEVELAND, OHIO

REPUBLIC BOLTS NUTS and RIVETS and similar staples are made with the same care and high quality of material as are the familiar Republic railroad specialties.

DO YOU KNOW THAT YOU PAY FOR CREOSOTE WHETHER YOU USE IT OR NOT?

Koppers helps Railroads to save money in many ways!

You pay MORE for *not* using creosote than for using it. You pay in renewals of decayed timber and in extra labor costs for replacements.

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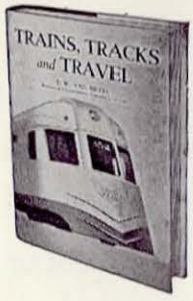

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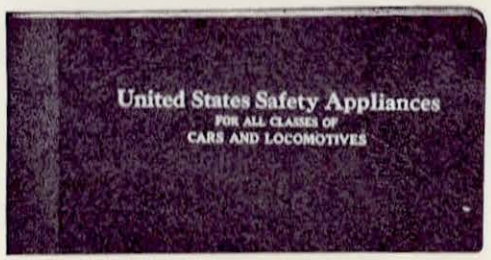

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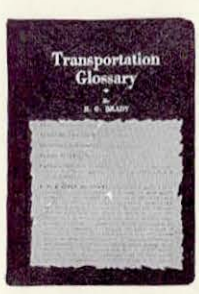

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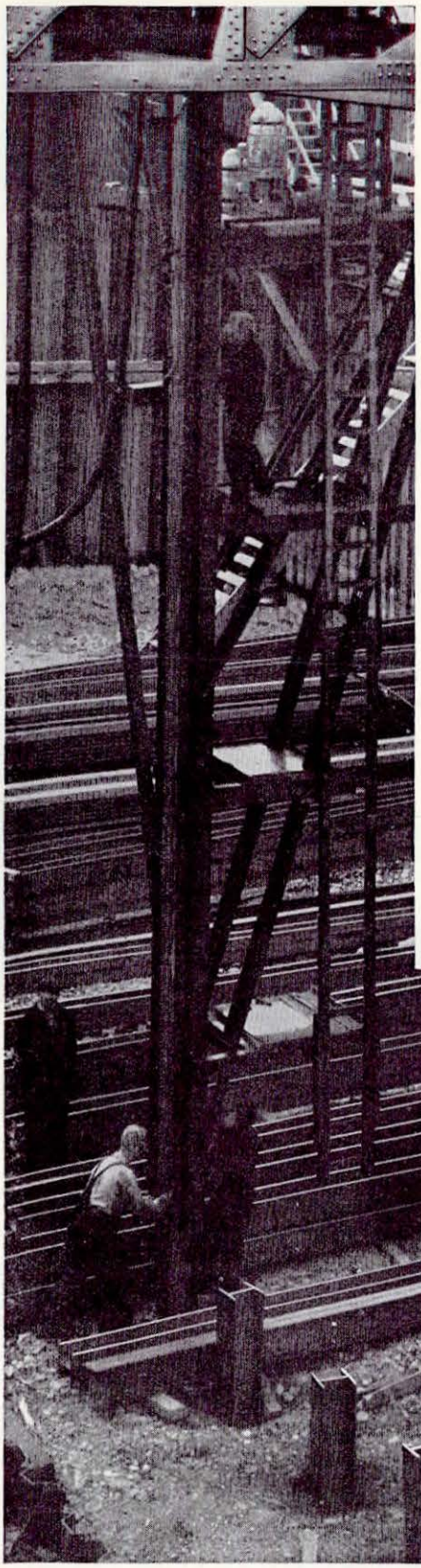
1929. 119 pages, 5 x 7 inches, flexible. $1.75



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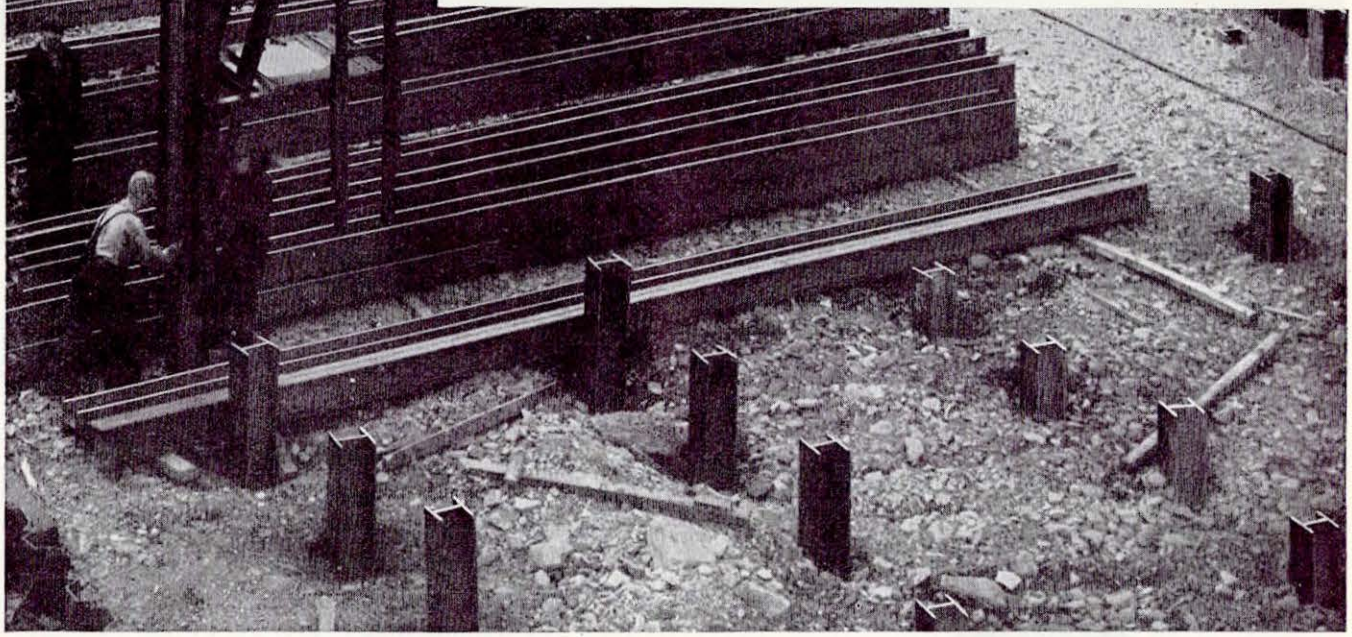

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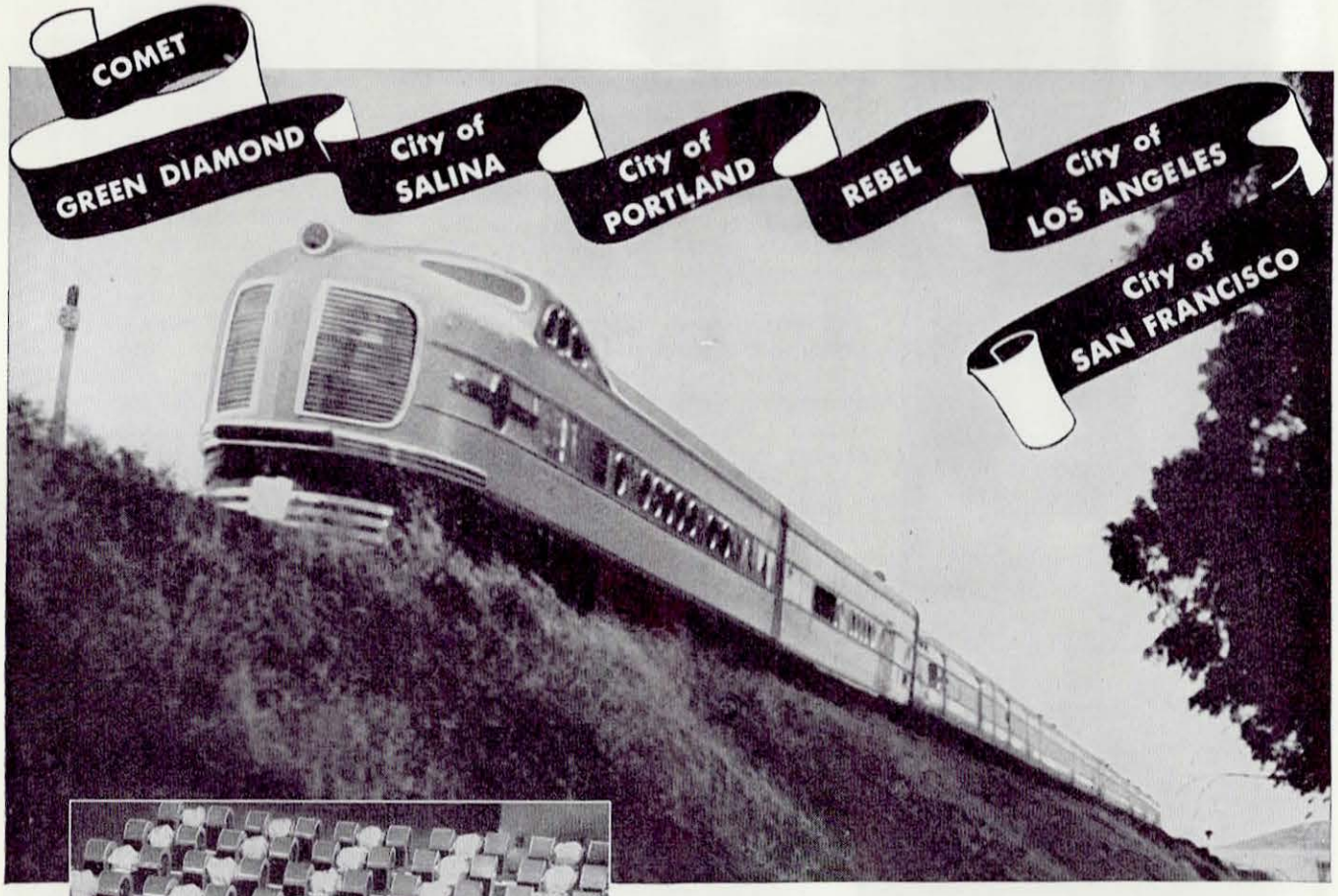

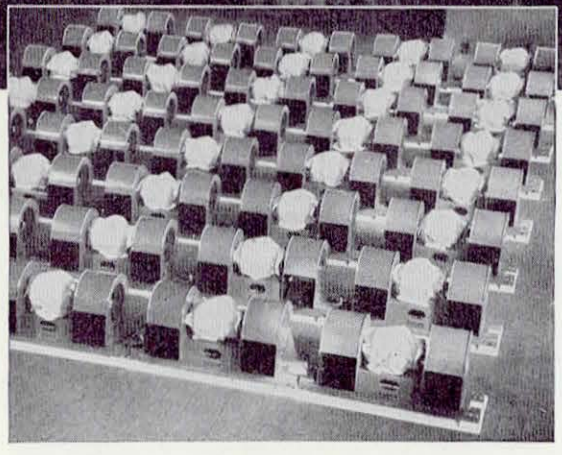

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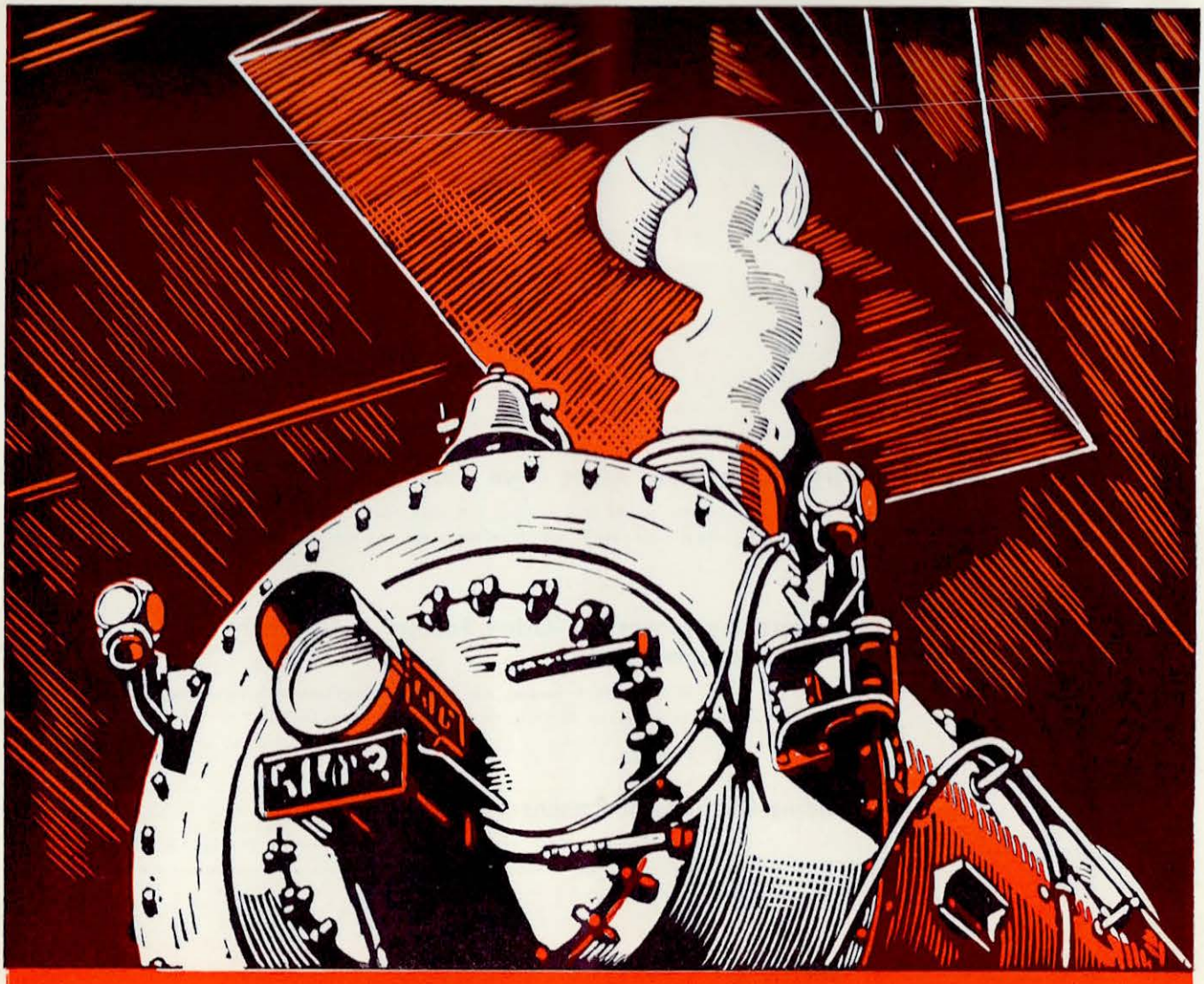

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Inflation

"Inflation" has been a frequent and important word in economic discussions for three years. Its frequent use was started by New Deal policies intended to advance prices to the level of 1926, which, it was assumed, would reduce the load being carried by those who were in debt. The earliest of these policies were those of going off the gold standard and devaluing the dollar from 100 to 59 cents in gold. Fear and discussion of inflation have been intensified by the policies of vastly increasing federal expenditures, failing to advance taxes correspondingly, and consequently increasing the annual deficit and government indebtedness.

There is no disagreement among competent economists that by these means there has been laid the *foundation* for a more enormous inflation than ever has occurred in the history of this country—an inflation comparable to those which so greatly depreciated the currencies of European countries such as France, Italy and Austria during and after the war, and completely destroyed the value of money in Germany. Whether inflation actually already has begun in this country is a question in controversy. Whether uncontrollable inflation can be prevented if present monetary policies, and policies of government spending vastly in excess of income, are much longer continued, is a much more important and highly controverted question. Unfortunately, most persons do not realize what inflation is, how it can be caused or prevented, or why and how it would affect them. If they did, they would take a much keener interest in the current controversies regarding it.

Recovery in the 'Nineties and Now

The monetary policies of the New Deal were expressly and avowedly intended from their inception to cause a "mild inflation" sufficient to increase prices. Since their adoption prices have advanced, but whether owing to these policies is questionable. During natural recovery from a depression prices are always increased by increase in the demand for commodities. There was natural decline and recovery of business during the depression of the 'Nineties. Numerous artificial government measures have been tried during the present depression, first to arrest the decline, and later to stimulate recovery. Whatever the reasons, there is a remarkable similarity of the trends prevailing after the bottoms of the two depressions were reached. During the three years following 1894, in which railway freight traffic reached bottom, it increased 18 per cent. During the three years since that ending June 30, 1933, in which it reached bottom in the present depression, it has also increased 18 per cent. During the depression of the 'Nineties prices reached bottom in 1896 and during the subsequent four years increased about 21 per cent. During the present depression prices reached bottom in 1932, and during the subsequent four years have also increased about 21 per cent. The evidence indicates that in both the *natural* economic forces have dominated and determined the pace and measure of recovery.

What of the Future?

But some important things have been done and are still being threatened during this depression some of which were threatened but not done, and some of which were not even threatened, during the depression of the 'Nineties. The advocacy of free silver during the political campaign of 1896 was advocacy of inflation by 50 per cent devaluation of the dollar, but it was unsuccessful. During the present depression the dollar already has been devalued 41 per cent. There were no huge government expenditures for public works and relief, and consequent enormous unbalancing of the budget and increase of the government debt, during the depression of the 'Nineties, while there have been both, during the present depression and they are being continued. The facts that railway freight traffic and prices increased as rapidly after the bottom was reached in the 'Nineties as they have since the bottom was reached in 1932 are strong evidence that the New Deal policies of devaluing the nation's currency and enormously increasing the government's expenditures and indebtedness have had no stimulating effects upon recovery—or that their retarding influence

has fully offset their stimulating influence. What of the future?

Inflation in 1896 and 1936

The *Railway Age* has taken an active part in only one national political campaign. This was in 1896, when it helped to organize railway employees in support of "sound money"; and sound money won. During the next ten years railway freight traffic increased 127 per cent, railway gross earnings 110 per cent, the number of railway employees 83 per cent, and the total compensation paid to them 90 per cent. Such facts show that no mistake was made then by those who then opposed inflation or by the American people in rejecting it. The situation now existing is quite different from that which existed at the corresponding stage of recovery in the depression of the 'Nineties. The combination of the New Deal's monetary and spending policies leads directly toward *uncontrolled* and *uncontrollable* inflation. They constitute, in fact, a threat of much worse and more ruinous inflation than did Bryan's campaign for free silver in 1896. Therefore, it is now much more important even than it was forty years ago for all of the people, including railway employees, to be clearly and fully warned of what inflation is, why there is danger of it and what are its effects.

The moderate and healthy advance in prices which always occurs during recovery from a depression is caused by increase in the demand for property and commodities. Inflation first becomes manifest in the form of a much greater advance in the prices of property and commodities. The much greater increase in prices caused by inflation is not initially due to increase in demand for property and commodities, but to *depreciation in the value of money*. This depreciation in the value of money may be caused by different means. To advance prices by depreciating the value of money was the purpose of the New Deal devaluation of the dollar in 1933. It has had little apparent effect as yet, because most people have not understood its significance enough to begin to fear that their money will become less valuable—that is, may have a declining power to buy property and commodities. Once a large part of the people become afraid that their money will decline seriously in value, they begin a rush to exchange it for property and goods. This immediately starts a great increase in prices—and this *is* inflation. It causes everybody else to join the rush; and prices then increase so rapidly and much, unless drastic and effective measures are adopted to stop the inflation, that money declines greatly in value, or becomes absolutely valueless as was the case a few years ago in Germany.

Inflation, Railways and Railway Employees

The effect of real inflation upon all working for wages and salaries should be obvious. The storekeeper from whom they buy groceries can mark up his prices every day, or even every hour for that matter, in proportion to the decline in the value of money. *But wages and salaries cannot be increased every day or hour.* Consequently, the more inflation there is the more is the purchasing power of salaries and wages reduced. Every form and degree of inflation is equivalent to a corresponding reduction of wages until wages have been increased; and in no country in which real inflation has occurred has it ever been possible to advance *money* wages enough to offset the decline in their purchasing power.

The situation with which the railways and their employees would be faced in case of inflation would be especially difficult. The railways, unlike most industries, are subject to strict government regulation. They could not advance their rates without the permission of the Interstate Commerce Commission after long hearings. They could not advance wages without advances in rates excepting at the price of bankruptcy—a price they would, of course, resist paying to the last extremity. Therefore, probably no class of workers would find it harder to get advances in wages to offset inflation than railway employees.

How Cause—Or Prevent—Inflation?

How, then, is it likely that inflation would be caused in this country? Probably if it occurs it will be caused principally by continuance of government expenditures greatly in excess of government receipts. The federal government is borrowing most of the money it is spending—borrowing by selling bonds and increasing its indebtedness. There is a limit—nobody knows where—to the amount of bonds it can sell, because there is a limit to the credit of every government as there is to the credit of every individual. It is virtually forcing the banks to buy its bonds now. The more it spends the sooner will come the time when it will have to curtail or stop its issuance of bonds. When that time comes, if its expenditures still largely exceed the receipts it can collect in taxes, it will have to begin printing "fiat" money to pay the excess of its expenditures over its receipts. On the day that begins the people will begin to lose confidence in their money; and on that day uncontrolled and probably uncontrollable inflation will have begun. This has been history in innumerable countries; and we are following straight the road that has led them and their people to inflation and ruin.

The issue of inflation, although in a different guise, is as directly presented to railway employees now as it was forty years ago. All that is necessary to cause it is a continuance long enough of present government monetary and spending policies. These policies have as yet had no appreciable effect in stimulating recovery. But the policy of spending has had the very appreciable effect of causing an increase of billions of dollars in the national debt which is still continuing, and which every

railway employee will have to help pay if it is paid in taxes. If it is not all paid in taxes, it will be largely or wholly paid in printing press money depreciated or made valueless by inflation; and if we get real inflation no group in the country will be more injured by it than railway employees.

How, then, prevent inflation? First, change the government's monetary policies; and, second, stop its orgy of spending.

June Earnings

Complete totals of earnings for June and the six months reveal an increase of 47.5 per cent in net railway operating income for the month and 22.3 per cent for the six months' period, over last year. Operating revenues in June totaled $330,691,513, an increase of 17.5 per cent over last year, while expenses (including rents and taxes) increased 13.4 per cent to a total of $280,378,934. June's total of net railway operating income was exceeded last year in only three months—September, October and November—and this total has not been exceeded in any June since 1933. In that year in June the roads earned net railway operating income totaling $59,831,292 (or 19 per cent more than in June this year) with gross revenues aggregating only $278,329,371 (or 16 per cent less than gross revenues in June of this year).

The net railway operating income figure may be likened to the pulse or temperature of a patient. As it fluctuates it tells the tale of the health of a railroad, or of the dollars-and-cents value of the owners' equity in it.

From June, 1933, until June, 1936, railway business improved 19 per cent, but it is evident by comparing the net railway operating income of the two months that others besides the owners got all the increase and $9,518,713 more besides; there was less left over for the owners after the relatively brisk business of June, 1936, than there was from operations in June, 1933, when the gross revenue was 16 per cent less. The increase in wages, totaling more than 11 per cent, begun in 1934 and completed last year, accounted, of course, for a substantial part of the increase. Then there were over 100,000 more employees at work in June this year than in June three years ago. Total expenses (including rents and taxes) were 28 per cent greater in June this year than in 1933.

The railway "pulse" is improving, and owners may take comfort in net revenue in June which they had to wait for last year until the months of peak traffic. At the same time, it is evident that others besides the owners (employees principally, in higher wages and more jobs), are getting much more benefit from increased railway business than are the owners themselves.

July Orders in Markets For Railway Equipment

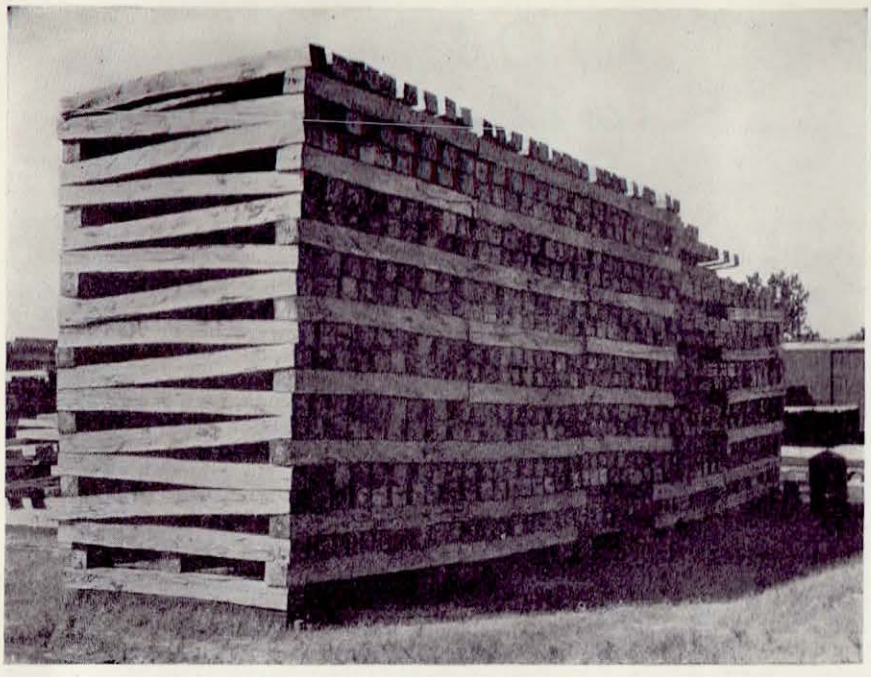
This year's domestic orders for freight cars and steam locomotives, which, as pointed out in the *Railway Age* of July 4, had by the end of June reached totals greater than those for the entire 12 months of any year since 1930, continued to forge further ahead in July. Also, July orders for passenger-train cars made this year's purchases in that connection more than twice as large as those of 1935's 12 months. Finally, with last month's orders for rail, the 1936 tonnage passed last year's 12 months total.

July issues of *Railway Age* reported domestic orders for 4,469 freight cars, bringing the 1936 total to date to 31,029 cars. This is approximately one and two-thirds the total of 18,699 ordered throughout 1935, and, exceeding, as pointed out above, the 12-month figure for any year since 1930, it is about two-thirds of the latter's total of 46,360. In addition there were export orders in July for 110 freight cars, making a total of 516 freight cars ordered here for export this year. This is a better export volume than that reported for the entire 12 months of any year since 1930, save 1934, when export orders totaled 1,323 cars; last year 110 freight cars were ordered here for export. Also there has been reported since the foregoing was compiled an order for 3,000 tank cars, and on August 1 inquiries were outstanding for 575 freight cars, and plans had been announced for the acquisition of 1,000 others.

Nine locomotives were ordered in July—seven steam, one Diesel-electric and one steam-turbine electric. During the first seven months of this year a total of 131 locomotives, excluding power units for streamlined trains, has been ordered. Of these 104 were steam and 27 of other types. As stated at the outset 1936's steam locomotive orders had by June 30 exceeded those of the entire 12 months of any year since 1930. This year's orders for locomotives of all types—131—are about 58 per cent above last year's 12-months total of 83 and, among the five past years, are exceeded only by 1934's 183 and 1931's 176. On August 1 inquiries for 11 steam locomotives were outstanding while plans had been reported for the purchase of three others. Also, there was an inquiry for three locomotives for export.

The 34 passenger-train cars ordered during July brought this year's total to date to 141, excluding articulated units for streamlined trains. This is more than twice the 63 passenger-train cars ordered throughout 1935, and is larger than the total for the entire 12 months of any year since 1930, except 1934 when 388 passenger-train cars were ordered. Inquiries for nine passenger-train cars were outstanding on August 1.

Rail orders reported during July totaled 44,500 tons, thus bringing this year's seven-months total to 512,985 tons as compared with the 495,300 tons placed throughout 1935.



To Prevent Early Decay, Gum Ties Must Be Stacked in Open Piles—the German Method of Stacking

Does Gum Wood Make Good Ties?

Some roads refuse to use it; others seek it—A study to determine the reason for this difference in attitude

IS gum a suitable wood for crossties? If so, how does it compare with other woods? If not, what characteristics make it unsuitable? Are some species of gum better than others? So far as memory goes there have always been differences of opinion concerning the value of certain woods for crossties, but of all of the timbers available for this purpose the greatest differences, in recent years at least, have prevailed with respect to gum.

As an indication of this wide diversity of opinion, some roads refuse even to consider gum as a material for crossties; others hold their purchases to the lowest point consistent with practical considerations of tie production; while still others accept it, but with hesitation. On the other hand, certain roads accept it freely, while several endeavor to obtain as many gum ties as practicable. Similar differences also prevail among those who use gum ties, with respect to the relative values of the different species of gum for crosstie purposes.

These strongly contrasting attitudes toward a material that is readily available over a wide area at comparatively low cost, inspired an investigation to determine why these differences exist, in which 13 chief engineers and engineers maintenance of way were invited to collaborate. These officers were selected, first because they represent roads which run through sections where the supplies of gum timber are most abundant and have, therefore, a first-hand knowledge of the timber and its characteristics; and, second, because their roads also represent substantially the entire range of practices with respect to gum ties. They by no means include, however, all of the roads that are tributary to supplies of gum wood, or that do or do not use gum for tie purposes.

While, botanically, there are seven species of gum indigenous to the United States, for tie purposes they may be confined to only three species, namely, black or sour gum, sometimes confused with tupelo; sweet or red gum; and tupelo or cotton gum. It should be borne in mind, however, that there may be considerable differences in the wood from the same species, depending on whether the tree has grown in a swamp, in rich alluvial soil or in poor upland soil. It should also be noted that all varieties of gum decay very quickly after the tree is cut, unless special care is taken to prevent it.

Practices in Purchasing Gum Ties

Only a cursory investigation is necessary to show that there is a wide diversity in practices with respect to the purchases of gum ties. In the study that was made it was found that 3 of the 13 roads canvassed do not purchase them at all, 1 keeps its purchases to the lowest practicable minimum, while the remaining 9 roads under consideration accept them to the extent of 6 to 30 per cent of their total requirements. It is of interest also that while some of the latter accept all species indiscriminately, others either reject certain species or do not buy them for reasons not connected with their suitability.

Among those that do not buy any gum ties, L. P. O. Exley, chief engineer of the Gulf, Mobile & Northern reported that, "While our experience has been very limited, we did use some creosoted black-gum ties which gave unsatisfactory service, although it was claimed that they were not seasoned properly." The Mobile & Ohio is another road which does not use gum ties, although B. A. Wood, chief engineer of this road, stated, that while "we do not use gum ties, we do use a relatively large amount of treated gum for planking at highway grade crossings and find it very satisfactory." The attitude of the St. Louis Southwestern toward gum ties is

shown by the statement of W. S. Hanley, chief engineer, that "we keep our purchases of gum ties to the lowest possible minimum."

A road which, while not objecting to gum ties, does not buy them for reasons which have no bearing on their suitability, is the Kansas City Southern. According to A. N. Reece, chief engineer, "we have purchased gum ties in only two recent years—1929 and 1932—when they represented 7 and 6 per cent, respectively, of our total purchases." The primary reason for not using gum ties, is that "we are able to fill our requirements with oak ties, beside which the period when gum ties should be cut is generally the rainy season, which makes it difficult to obtain production."

As contrasted with these roads, G. W. Harris, chief engineer of the Atchison, Topeka & Santa Fe system, reported that this road "has applied 2,034,849 gum ties in maintenance during the last 10 years, of which 1,109,388 were hewed and 925,461 were sawed. This total," said Mr. Harris, "is 60 per cent of all of the hardwood ties used for renewals, although it is only 8.8 per cent of the total of 23,092,632 ties used in maintenance during this 10-year period." Although the Texas & Pacific did not purchase any gum ties in 1933 and 1934, R. H. Gaines, engineer maintenance of way, stated that, "we used more than 1,000,000 black and sweet gum ties from 1924 to 1932," adding, however, that his road had "purchased a smaller number in 1935 than in former years."

Likewise, the St. Louis-San Francisco "uses all species of gum, that is, black, red and tupelo, indiscriminately," said F. G. Jonah, chief engineer. A similar belief in the value of gum as a material for ties was implied by K. H. Hanger, engineer maintenance of way of the Missouri-Kansas-Texas, in his statement that "black gum ties at present constitute about 30 per cent of our requirements. A few years ago our purchases of black gum amounted to about 50 per cent of the total, the reason for this reduction being purely the shrinkage of the available supply of this wood." Mr. Hanger added that "we do not use many red gum ties, as those we have used have not been as satisfactory as the black variety."

Opinions Differ With Respect to Species

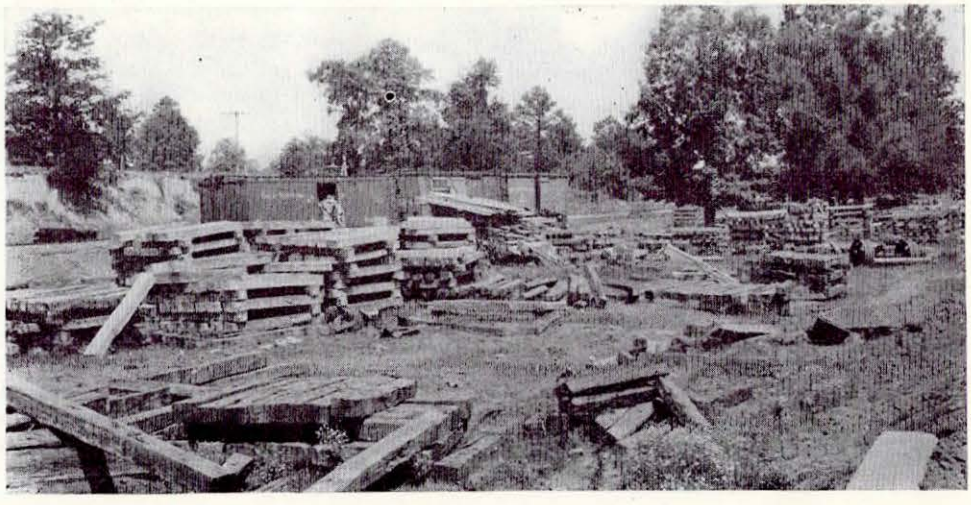
These expressions illustrate the wide diversity of opinion concerning the suitability of gum as a material for ties. It was found, however, that there is an equal diversity of attitude with respect to the relative value of the different species of this wood. As an example, F. T. Beckett, engineer maintenance of way of the Chicago, Rock Island & Pacific, reported that "20 per cent of all of the ties purchased by this road are gum. Formerly, these were divided 18 per cent red gum and 2 per cent tupelo or black gum. But effective with 1935, the purchase of tupelo gum was discontinued because the timber is light and brash after seasoning, and apparently is unable to withstand wear effectively." A different viewpoint was expressed by A. A. Miller, engineer maintenance of way of the Missouri Pacific, in his statement that "we take from 7 to 11 per cent of our total requirements in gum, making no discrimination between species, since we merely specify gum." On the other hand, according to G. R. Smiley, chief engineer, the Louisville & Nashville "uses only sap-bound black gum, because this timber is equal to any and we believe that it makes the most satisfactory tie we can get."

An instance of non-use of black gum for reasons not connected with its suitability was given by E. A. Craft, engineer maintenance of way of the Southern Pacific lines in Texas and Louisiana, who advised that "about 10 per cent of our crosstie requirements are supplied in sweet or red gum. It is seldom that black-gum ties are offered, since there is a good market for black gum for other purposes, which yield higher prices than can be obtained for ties." He also added that "tupelo gum is not accepted."

A still different attitude toward gum ties was expressed by L. H. Bond, engineer maintenance of way of the Illinois Central, who indicated that while his road has no inherent objection to gum as a material for ties, it desires to clear up certain uncertainties with respect to manufacture and treatment before it commits itself to the use of gum on a large scale. Mr. Bond's comment was that "while gum is not considered a standard material for crossties and switch ties on the Illinois Central, small lots of gum are purchased from time to time for the purpose of studying the best practices in production, seasoning and treatment. There is an abundant supply of gum woods on our southern lines, where most of the hardwoods do not have a satisfactory life, and we are deeply interested in any possibilities for improvement that may be offered by gum.

"We prefer black gum," continued Mr. Bond, "because it resists wear and splitting, has a smaller amount of heartwood than most of the gums, and seasons and takes treatment well. Our second choice is tupelo, which is generally of a much softer texture, although in some cases it is almost impossible to distinguish it from black gum after manufacture. The red or sweet gums are harder to season and treat, for which reason they are accepted only when there is sapwood on each of the four corners of the tie."

Assuming that the reason for this wide diversity in attitude toward gum ties might be found in the results obtained from their use by the different roads, each of



Conditions Like This Breed Infection in Gum Ties

these officers was asked what his experience had been with each species as to life and service and how these compared with pine, red oak, etc. The responses to this question showed wide variations in the results, as has already been indicated in some of the discussions quoted. More specific information from other roads follows.

"Our records make no separation between the species of gum," said Mr. Harris. "The Santa Fe has had excellent results from treated gum ties—about the same as from southern pine and red oak which have been given the same treatment. As in other woods used for ties, however, the amount and placement of the sapwood is important in gum." Likewise, the Rock Island does not distinguish between species of gum in its records of tie-service life. "Our experience with gum ties is, however, that their life is about two years shorter than red oak and about two years longer than pine," said Mr. Beckett.

It has been Mr. Hanger's experience that "black-gum ties treated with creosote are as good as, and probably better than pine or red oak treated with creosote. They hold gage better than pine and about the same as red oak. It is our observation that red oak deteriorates somewhat faster than black gum. On the other hand, the exterior rings of black gum are very compact,—although they take excellent treatment, and a few years after installation become very hard; in fact, it is rather difficult to penetrate them with a spike. Failure in black-gum ties usually occurs through deterioration of the heart section."

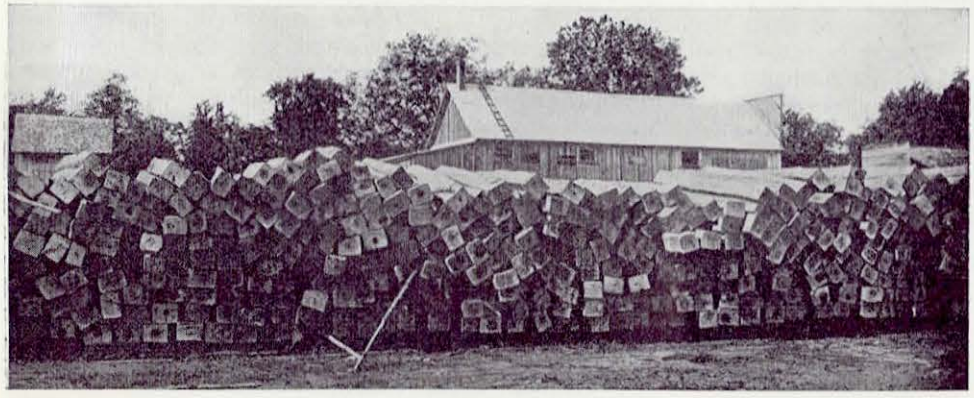
"It is the experience of the Missouri Pacific," said Mr. Miller, "that when well treated, gum ties outlast pine because of their higher resistance to wear. Yet the heartwood decays rapidly if not penetrated with creosote, and it is practically impossible to get satisfactory penetration of the heartwood of some species." Colonel Jonah reported that the Frisco "gets somewhat better service from black than from red gum, because the former usually contains more sapwood and takes treatment better."

Mr. Hanley stated that "experience with gum ties on the Cotton Belt has been unsatisfactory" and that "as compared with pine and red oak, the life is much shorter." "The Texas & Pacific has not obtained satisfactory results from its gum ties," said Mr. Gaines. "Those we have used had too large a proportion of heartwood and did not take treatment well. In fact, the treatment in the center of the ties, midway between the ends, was insufficient, the result being that many of them are hollow, with an outer shell of treated wood. We think that, in the light of this experience, our handling preliminary to treatment, that is, during the seasoning period, was not as careful as it should have been. Gum ties have a distinct advantage over red-oak ties, in that they do not check badly. For this reason, they do not require S-irons and may, therefore, be sized for length when they are adzed and bored."

An interesting comment on the relative value of the different gums for tie purposes was made by Mr. Craft, who said that "it has been the experience of the Southern Pacific that of the gums, the black variety is the easiest to handle for seasoning, while it takes treatment better, especially into the heartwood. Tupelo gum contains a large percentage of poor timber, is very light in weight, is brittle and is without adequate strength to serve satisfactorily for crosstie purposes.

"The heartwood of red or sweet gum will not take treatment, and we regard sawed ties cut from the heartwood of large red gum logs as not worth the cost of handling and treating. Based on our experience, our specifications limit the acceptance of sweet or red gum to hewn ties or those sawed from trees of such diameter as will permit the sawing of only one tie from a section of the log. In such small trees, the diameter of the heartwood is generally small, permitting a suitable depth of sapwood, which takes fairly good treatment."

Although the Illinois Central is using gum ties to only a limited extent at present, "we believe," said Mr. Bond, "that winter-cut gum ties, if carefully seasoned and thoroughly treated with creosote at the proper time, will give a long, satisfactory service on a large part of our lines. Some of our officers believe that they will outlast both pine and oak."



A Sure Way to Invite Decay in Gum Ties

Seasoning Important Factor

It will be noted that a number of the foregoing comments emphasized seasoning as a factor affecting the performance of gum ties. In view of the rapidity with which gum decays unless the seasoning is carefully controlled, the study included a review of the practices of the roads with respect to the removal of the ties from the woods, the limitation of the cutting period, and the method and period of seasoning. Without exception, all of the roads using gum ties insist that they shall be brought out of the woods as soon as they are made, and stacked in open piles at station concentration yards for inspection. It was pointed out that the reason for this requirement is that gum is particularly susceptible to decay and that the conditions in the woods in which gum is native are unusually favorable for infection by decay-producing organisms.

Equal insistence is placed on early inspection and shipment to the treating plants where the ties can be placed in sanitary seasoning yards and kept under constant observation. Special attention was called by several officers to the desirability of making these shipments in open-top or stock cars, particularly in warm weather, since sap decay is likely to get a start in the short period required between the inspection yard and

the treating plant if closed cars are used. For the same reason, the ties must be unloaded promptly upon arrival at the seasoning yard.

In view of this extreme susceptibility of gum to infection and decay, most roads do not accept ties of this wood that are cut from early spring to late fall, although two roads, the Santa Fe and the Frisco, both of which use a great many gum ties, accept them when made during any month of the year. Even among those roads that restrict the cutting period, however, there is little consistency in the limitation placed on this period. As an example one road restricts the cutting period to August 15 to December 31; another, from September 1 to April 1; still another, from November 1 to February 15; while a fourth accepts only ties cut during the months from November to February, inclusive; with other dates intermediate to those cited. Again one road specifies that the ties must be cut only during the late fall and early spring months, and another "when the sap is in the ground."

Sap Decay Starts Quickly

Experience has shown that it is necessary to provide for free circulation of air around gum ties during the seasoning period. Otherwise, sap decay starts almost immediately and, once started, is completely out of control, so that the timber becomes a dead loss. For this reason, the method of stacking during the seasoning period by those roads using gum ties became a subject of inquiry. It was found that among these roads it is the invariable practice to stack gum ties in open piles. using either the alternate 2 and 7 piling or the 1 and 9 method, the latter being known generally as the German method.

Those who have been most successfully in the use of gum ties attach fully as much importance to the duration of the seasoning period as to the precautions to be observed in production, shipment and stacking for seasoning. Substantially all of these officers emphasized the danger that attends overseasoning. Without exception, on the roads in question, the ties are watched carefully and are treated as soon as seasoning has progressed to the point where satisfactory penetration can be obtained.

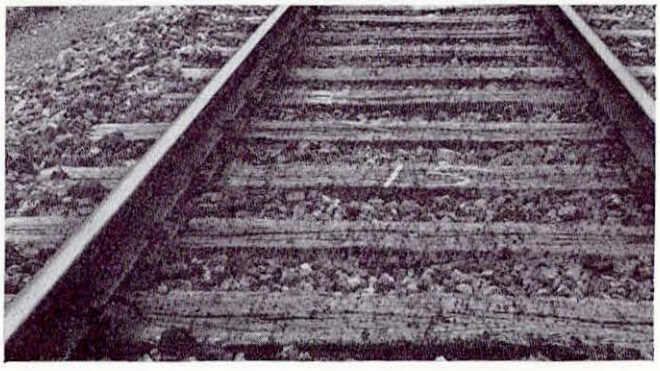
In general, the period of seasoning for gum ties is shorter than for other hardwoods, ranging from 4 to 10 months, depending on weather and temperature conditions. Thus, the Santa Fe is able to season gum ties in from 4 to 6 months at its treating plant at Somerville, Tex., but requires from 6 to 8 months at Wellington, Kan. The Missouri Pacific finds that an average of 4 months is sufficient, while the Rock Island requires from 7 to 10 months.

Several officers qualified their statements, however, by saying that the duration of the seasoning period depends so much on humidity and temperature conditions that there might be relatively wide variations from the figures given. As an illustration, Mr. Craft made this comment: "The amount of air seasoning that can be given depends largely on weather conditions. So long as the weather continues dry, gum ties will air season satisfactorily. On the other hand, a succession of wet and dry spells during the summer induces rapid and destructive infection."

Experience has shown that creosote is the most effective preservative for gum ties, but that to get best results it is necessary to secure the maximum penetration that can be obtained. A few of the roads under discussion are using straight creosote, but the majority use either a creosote-petroleum or a creosote-coal tar mixture, the proportions of which vary from 70-30 to 50-50. Substantially all of the roads were compelled to resort to zinc chloride about 1915, owing to the shortage of creosote occassioned by the war. As a result of this experience, the officers of these roads are in complete agreement that gum ties treated with zinc chloride have a much shorter life than those treated with creosote.

In the light of the information obtained from the roads whose practices have been discussed, it seems fitting to analyse the reasons why such widely differing opinions are held by maintenance officers with respect to the suitability of gum as a material for crossties. The facts presented by the selected roads, supplemented by information from many other sources, makes it clearly evident that not a few roads, in fact substantially all, that have attempted to use gum for ties, have had unfortunate experiences.

Information from these sources leads to the conclusion that some of those who now strongly condemn gum have assumed that the trouble they experienced is inherent in the wood and have let it go at that, without seeking either to confirm this conclusion or prove its falsity. Others have sought to discover the source of the trouble, but failing to throw some of the safeguards around the production, handling and seasoning of the ties, which are now known to be necessary, have also concluded that gum is not a satisfactory material for crossties.



These Gum Ties, After 24 Years, Are Still Good For Many More Years of Service

Those who have persisted in their efforts, however, have learned that, while all species of gum are particularly sensitive to infection and, once infected, decay rapidly, most gums make good ties and some make excellent ties. They have also learned that gum ties cannot be expected to give satisfactory service unless certain definite precautions are taken during every stage of their manufacture, from the time the tree is cut until the ties emerge from the treating cylinder.

These precautions differ not in kind, but rather in degree, from those that should be observed in the production of ties from any other wood. In other words, the opportunity for infection should be minimized, the ties should be seasoned as rapidly as practicable, and the preservative should penetrate as deeply as possible. It should not be overlooked, however, that there is a wide difference between the statement of these seemingly simple principles and carrying them out.

When Should They Be Cut?

So far as the quality of the wood itself is concerned, it apparently makes little difference whether the ties are cut "when the sap is up" in the summer or when it is "down" in the winter. On the other hand, the op-

portunities for infection, always pronounced in the forests and climate in which gum is native, are greater in summer than in winter. Against this, winter is the rainy season, when it is difficult to handle the ties expeditiously, so that there may be delay in getting them out of the woods.

Prompt removal from the woods is important, however, to avoid infection, since it is difficult and usually impossible to arrest the progress of decay, once it gets a foothold. Experience has shown that the germination of the fungous spores can be checked to a reasonable degree by keeping the surface of the wood dry and allowing the air to circulate freely around it. This is the primary reason for the emphatic requirement that gum ties be stacked in open piles. Conversely, close piling, which prevents free circulation and retards the evaporation of surface moisture, provides most favorable conditions for the germination of the spores and growth of the fungi. In fact, so rapid is this growth under close piling that experienced maintenance officers insist on open-top or stock cars for shipping the still untreated ties to the seasoning yard, regardless of the time involved.

Red oak and some other woods check badly and even split if they are seasoned too rapidly. In some cases even the use of S-irons is not sufficient to overcome this tendency where the seasoning occurs rapidly. In contrast, the gums have closely knit fibres and the wood is unwedgeable, for which reason they can be seasoned as rapidly as conditions permit, without danger of checking. Aside from this lack of damage by checking, there is a marked advantage in this characteristic of gum, for there are no S-irons to interfere with trimming the ends of the ties as they pass through the adzing and boring machines, thus making it possible to inspect the ends for possible decay before treatment.

Overseasoning in gum may be as serious as failure to observe proper precautions during the seasoning period. In any event, prolongation of the seasoning period beyond the point of properly conditioning the ties adds to the danger of decay. For these reasons, roads using gum ties generally make it a point to have the ties watched carefully while seasoning by some one experienced in the handling of gum to insure that they will be treated as soon as they have become properly conditioned.

In all species of gum the sapwood takes treatment well, but the heartwood resists penetration of the preservative, more definitely in some species than in others, the sweet gums generally being the most refractory. In consequence, most roads endeavor to obtain ties with as much sapwood as practicable, particularly if they are of red gum. In fact, some roads will not accept red gum ties unless the heartwood is completely boxed or surrounded with sapwood.

The difficulty of getting satisfactory penetration of the heartwood by the preservative has been one of the factors that have given gum ties a bad name in some quarters. Emphasis has been placed on the necessity for closing every avenue to infection if the use of gum ties is to be successful. Observation over many years, as well as the testimony of maintenance officers of many roads, has shown that the great majority of gum ties fail from interior decay.

How Heartwood Becomes Infected

Before it was customary to prebore ties, an easy avenue for the entrance of decay-producing organisms was provided by the spoke hole, which penetrated the zone of treatment. To a large extent this means of entrance has been closed by preboring, with its resultant zone of treatment around the spike hole. There is ample room for still further improvement in the handling of the ties by the maintenance forces, however, by eliminating the use of picks and shovels to pull them into the track and of striking them with mauls and sledges to space them or shift them endwise into position under the rail. Elimination of these abuses will increase the average life of any class of ties, but particularly of gum ties, since the life of gum ties may be measured by months, once decay gets a foothold.

Information at hand indicates clearly that no form of treatment or type of preservative can salvage a gum tie or insure a satisfactory service life if decay has been allowed to get a foothold. Assuming, however, that seasoning has been completed and the tie is sound, the preservative and method of treatment become paramount. It has been shown from the testimony of the officers who collaborated in this study, that zinc chloride is not a satisfactory preservative for gum. There is no evidence from this source or others that any preservative except creosote has been used widely enough to warrant conclusions as to its effect on the service life of gum ties.

In the early days of tie treatment, such gum ties as were treated with creosote were treated by the full-cell process. Later, this was generally superseded by the empty-cell process, the retention being about 5 lb. per cu. ft. of wood. Still later, creosote-petroleum and creosote-coal tar mixtures came into favor and are now used more widely than straight creosote. The range of the proportions of these mixtures has already been given.

As has been emphasized, the depth of penetration of the preservative is an important factor in extending the life of gum ties. With respect to the use of preservative mixtures, Mr. Harris illustrated the general attitude of those who have adopted them, in his comment that "from 1924 to the present we have been treating with a 50-50 mixture of creosote-petroleum residuum, and an 8-lb. retention, applied by the Rueping (empty-cell) process. This treatment was adopted to add to the quantity and percentage of the petroleum per cubic foot of wood, thus increasing the volume (the former practice was a 7-lb. treatment with a 70-30 mixture) of the preservative mixture retained, and the depth and uniformity of the penetration. We have found this treatment beneficial with respect to the retardation of surface checking and weathering, while the cost is about the same as a 5-lb. treatment with straight creosote."

Summary

In brief, it would appear from the survey that (1) difficulties have been encountered in the use of gum ties; (2) these difficulties can be overcome by simple precautions to protect the ties from infection; (3) these precautions do not differ, except in degree, from those which should be taken with other ties; (4) gum ties should be treated with either straight creosote or a mixture of creosote with either petroleum or coal tar; (5) where these precautions have been taken, gum ties rate equal or better than southern pine and red oak as to ultimate life, and superior to either of these woods in holding gage, freedom from splitting and resistance to wear.

The Keystone Quartet, of the Pennsylvania Railroad, made up of employees of the accounting and car service departments of the road, at Philadelphia, has in the six months ending June 30 last sung before 94 audiences, totaling 42,375 people, in 44 cities scattered throughout the East, the South and the central West. A statement issued from the general offices of the road says that these men have during this period kept fully up with their regular work.

Forestalling Moves of "Other Fellow"

A NECESSITY IN PRICE COMPETITION*

By F. J. Lisman

Since reductions will be made anyhow, why not make them before trucks, barges get the business? Passenger department has shown the way to freight traffic revival

FROM the angle of actual operations, railroad officers of the United States have always, on the whole, done a good job. This is not merely an assertion or tradition but can be proven by comparison with costs in other countries. This job is not 100 per cent efficient, but nothing in human affairs can achieve this. Its percentage of efficiency, as far as it is capable of analysis, will compare with industrial, mercantile and particularly governmental operations.

Roads Excel at Competing with Each Other

From the angle of merchandising, that is, of selling their services, American railroads have not done a good job. This statement can also be proven by comparison with results attained in other countries; for example, in Great Britain. Conditions are never quite alike in any two countries and governmental interference in Great Britain is infinitely less than in America, while governmental co-operation is infinitely greater. Our railroad officers and traffic solicitors were brought up in an era when transportation was substantially a monopoly of the rail carriers. During this period they concentrated on competing with each other quite effectively, and, as time went on, more and more wastefully. One company after another introduced some wasteful practice in the hope of getting more competitive tonnage. Such practices were promptly met by the others until finally all companies were competitively on a parity, both from the point of view of giving shippers substantially the same facilities and their security holders a lesser return on account of wasteful expenditures of capital or for operating expenses.

The huge expenditures for warehouses, elevators, etc., are a fair example of capital waste, and free switching service to large industries and the permission to reroute cars in transit at a substantial cost to themselves but at no cost to the shippers, etc., are evidences of operating wastes.

Successful Business Anticipates the "Other Fellow"

Officers up to about 1928 so concentrated on inter-railroad competition that they failed to visualize that other methods of transportation were likely to cut more and more rapidly into their imaginary monopoly. A manufacturer or purveyor of most other services tries to figure out what his competitor is going to do, and then endeavors to beat him to it—whether it be by way of changing the method of service, reduction in price, or both. Railroad officers, instead of anticipating the moves of the other fellow and studying his steadily decreasing costs and future possibilities, have made nearly every concession in price and service protestingly and reluctantly and most always too late. Practically every one in contact with transportation knows of examples of this, but it might be just as well, in order to prove this allegation, to recite a few of them. There is the interesting case of the manufacturer of glass linings of tanks for breweries who had to do some thinking when prohibition went into effect and annihilated his market. He bethought himself of the desirability of glass linings for the conveyance of milk and endeavored to interest the railroads in thus transporting this commodity. His ideas met with no encouragement either by way of trial or adequate rates. Thereupon he took this matter up with some builders and operators of trucks who did respond and who, in consequence of showing a little more vision, are now handling a large proportion of the milk traffic. The railroads are now willing to make rates equal to probably one-half those which, if they had made them at the inception of the idea, would have held the business, but it has left them for good.

Loss of Gasoline Traffic

There is the case of gasoline rates from the Port of Mobile, where there is water competition, to the Birmingham district. In 1931, the traffic manager of an important oil company informed the interested railroads that the marketing division of his company was contemplating moving gasoline by barges to points in Central Alabama. The rate from Mobile to Birminghamport at that time was 30½ cents per hundred pounds. The official of the oil company stated that if he could get a 25 cent rate, the railroads would hold the business. They did not do it. In consequence, substantially all the major oil companies in this section are now handling gasoline in barges, and the subsequent reduction of the railroad rate to 15½ cents per hundred pounds has not been able to fetch the business back to the rails. Examples of this kind could be multiplied ad infinitum.

Over one-half the Florida citrus fruit traffic has already left the rails, which accounts in part for the financial plight of the carriers serving that state. At present the Florida citrus fruit producers want the rail rates to middle western points reduced to a level competitive with suggested truck and water rates, in order to enable them to continue their customary methods of shipping this particular traffic by rail. The Federal Barge Line has proposed the construction of refrigerated barges; refrigerated trucks are multiplying. Thus far the rail carriers have declined the request of the shippers for lower rates, while their competitors are proposing to grant them provided they are assured of an adequate

* The *Railway Age* takes pleasure in presenting this article by this stimulating analyst, but with the belief that there is much to be said on the "other side" in some of the situations he criticises.—EDITOR

volume of traffic to justify the necessary capital investment.

The I.C.C. could not reasonably refuse to authorize such lower rates by competing carriers if they could make a showing that such rates would pay all their operating costs plus depreciation and a fair return on the investment. Of course, it has not the power to prevent lower rates in the case of water lines and intrastate motor carriers. Fully one-half of the strawberry crop of the extreme South during the 1936 season was moved by truck at a loss of probably fully $500,000 in gross revenue by the railroads, because some of the large carriers declined to face the disagreeable reality that it was necessary to reduce both minimum carload requirements and rates as well.

Too frequently traffic managers haggle with the shippers, giving them a reduction which does not hold or regain competitive business but merely reduces the revenue on tonnage still tied to the rails. Obviously it would be silly to reduce rates according to shippers' demands only; such action must be based on a thorough study of competitive costs and their potentialities. The average traffic man is probably no more qualified to make such analyses than would be a salesman of Fall River cotton textiles to comprehend and forecast the cost accounts of a Japanese textile mill. Yet the competitors' costs are the measure of the job before him. Is there any department in the average railroad organization qualified for making such analyses? If not, why not get to it now—it should have been done ten years ago.

Lest the writer be accused of condemning by the clear cold light of hindsight, there follows a quotation from an article in the *Railway Age* of January 2, 1920:

> Automobile roads must take the place of most branch lines and the sparsely settled states will have to enact legislation to aid in railroad construction, which will be more or less along the lines of drainage and irrigation development.

And from an article in the *Railway Age* of December 8, 1928:

> The railroads are in excellent position to compete with trucks if they will face the situation and promptly modernize their plants, getting the maximum result at the least cost out of the combination of long haul by rail plus short haul service by truck. They thus will be able to utilize their facilities to the fullest advantage. The motor truck business is still in its infancy.

Undoubtedly the railways can make a strong showing that present rates do not pay a fair return on their physical valuation. However, if others can handle the business more cheaply, a low rate of return merely proves that some of the capital invested in the railroads must be written off permanently. The market place for railroad securities has already done this by adjusting security prices accordingly. The law of the "survival of the fittest" is at work all the time in every walk of life and protesting against it is a loss of time and energy, of benefit only to some members of the legal profession.

Railroads Should Fight to Establish Train Load Rates

Tens of thousands of miles of pipe lines have been constructed during the last 15 years to carry crude oil or gasoline which the railroads could have carried as cheaply and without additional capital investment if they had been allowed to make train load rates. Because the I.C.C. years ago did not permit train load rates, little or no effort whatever has been made to show the unreasonableness of this ruling under changed conditions. Nor have train load rates been mentioned in connection with Fourth Section relief on transcontinental traffic!

Undoubtedly some man of vision, who can see the industry as a whole instead of looking at it from the narrow compartment of any one company, would long ago have visualized and put into effect, as far as any one man or company could, a universal container, closer co-ordination between the rail and highway carriers, etc. Surely it was obvious to thousands of others in 1927, as it was to the writer at that time, that the highway carriers were going to bring about a great change in transportation which would require co-ordination, change in the methods of hauling l.c.l. traffic, the development of containers, etc. Some not only saw it but acted upon it and profited thereby, as is evidenced by the various carloading and car owning corporations and others who embarked in this line of business and are now thoroughly rooted in the transportation field, making a profit which the carriers should have reaped themselves by being more forehanded and aggressive.

There are few cases of mature, well-known railroad executives who have been offered employment in other walks of life during the last decade, but the writer is not able to recall a single case of a traffic or merchandising man trained in other industry being hired by a railroad. A suggestion that new blood be introduced from time to time would probably meet with the usual objection: "Our situation is different—he would not understand it." Quite likely no field of endeavor can show as few interchanges of personalities with other walks of life as railroad transportation.

There has been much criticism on the alleged waste of the cost of the Co-ordinator's office but it certainly must be admitted that the Co-ordinator has done things which have stimulated thinking, which has accelerated many savings. The president of the A.A.R. in one of his recent speeches stated that the frozen per diem plan was saving the railroads about 10 million dollars per year and that the theoretical savings of upwards of 50 million dollars per year suggested by the Co-ordinator's organization were impossible. Frozen per diem in its present form probably cannot last. Among other difficulties with it, the western lines are quite likely to find that their box cars suitable for grain traffic are being considerably abused in hauling coarse commodities while on frozen time out of Western territory. But, anyway, it may be doubted that we would even have frozen per diem if it had not been for the Co-ordinator. The admitted one year's saving from this plan alone exceeds five times the entire assessment levied on the railroads to pay for the full period of the Co-ordinator's office.

Vested Interests which Oppose Co-ordination

Every unprejudiced person will admit that great savings by the co-ordination of terminals are possible, but obviously within every railroad organization there are vested interests which could scarcely be expected to become enthusiastic for unification of terminals. Whether there be three terminal supervisory staffs in a comparatively small center or twenty in a large city, it is obvious that co-ordination will cause heads of one or more of these staffs to lose their jobs or be demoted. Inasmuch as nobody is sure just who is going to hold his job in a unification, everyone works against unification and finds reasons why it cannot be done. It is not to be expected of human nature that it should be otherwise. Nor should supervisory officers be blamed too seriously if they write the kind of reports which they think the boss wants. Too often the boss is intolerant of any but "yes" men. It is difficult to ascribe any reason, other than this natural one of self-protection, for the opposition to a "clearing house" for interline accounts, recommended by the Co-ordinator. Certainly the opposition to co-ordination cannot arise from a purely unselfish concern for the good of the railroad industry as a whole.

In addition to narrow self-interest as an obstacle to

joint economies, there is also that which arises from sheer inertia. "After a lifetime of active work with big corporations," E. St. Elmo Lewis, an expert in merchandising, says, "it requires a good deal of effort to get an organization to do things differently from what it is accustomed, because it is so easy for the routinist to amble along in the same old rut. He resents with all the fervor of a narrow soul anything in the way of an innovation—and if you want to see fervor expressed in white heat of vicious criticism and vicious reprisal, you want to see a bureaucrat or a routinist at work on an innovation." (Quoted from "The Wedge" published by Batten, Barton, Durstine & Osborn, Inc.)

How far have the railroads gone toward co-ordination with highway carriers? They are still endeavoring to compete on l.c.l. short haul business and are bitterly resenting the activity of trucks in trying to handle profitable long haul business. Would it not be good sense for the railroads to withdraw from business on which they cannot make any money by asking permission from the I.C.C. to give up l.c.l. traffic completely within certain limits, say on heavy commodities up to 20 miles and on lighter commodities up to 100 miles? Sometimes it is contended that the short haul l.c.l. business would help to pay out-of-pocket expenses. This again recalls the story about the old lady who said she lost money on every pair of stockings she knitted but she made it up on the quantity.

Nothing Sacred About a Rate Structure if it Doesn't Move the Business

Authority on the recent application to the I.C.C. by the B. & O. and Chicago Great Western for permission to put in rates to haul trailers between large cities was slow in being granted, owing to opposition by other carriers on the theory that such action will seriously interfere with the rate structure. There should be nothing sacred in a rate structure which fails to produce results. As Clyde Brown of the New York Central once said, in effect, in a brief, the rate structure which embodies the genius of so many rate experts of times past may also perpetuate their mistakes. If any carrier can earn 20 cents gross per car-mile both ways and if the expenses involved in loading and unloading are nominal, it is pretty good business. Refusing to make these rates is not going to stop the trucks from handling it if they can make a reasonable profit. If the trucks should be prohibited from taking away the profitable long haul business of the railroads because it might cost them more to haul it over the highway than it does the rail carriers, then the shippers, whether they be manufacturers or distributers can and will do their own hauling if they can do it at a cost lower than the prescribed rates, whether by truck or rail. Anyone traveling on the highways who reads the nationally known names on passing trucks must become convinced of this.

Large truck operators are offering some regular trailer traffic to the railroads because, presumably, taking all costs and hazards into consideration, the railroads can handle these trailers at possibly one cent per truck-mile cheaper than it would cost to operate over the highways. This brings up the question—Why should not the railroads themselves pick up and deliver much l.c.l. and possibly other tonnage and handle it in trailers or interchangeable containers instead of again letting others make a profit which the carriers by being foreminded should secure for their own corporations; and for their security holders who have been deprived of a fair return on their investment by shortsighted management, technical regulating bodies, and largely ignorant vote-chasing legislators?

It is probable that the trucks and buses are not contributing their full share of constructing and maintaining highways plus their fair share of the general tax burden. That, however, is something which thus far has not been sufficiently analyzed and furthermore, if true, will tend to right itself in time. But it is not a condition the correction of which the railroads can expect to restore much traffic to them in the immediate future. The recent plaint published in "Transportation Topics" (the mouthpiece of the truckers) that the trucks with 13 per cent of the vehicles are paying 25 per cent of all highway taxes is the opposite from convincing, because if, instead of dealing with a ratio of trucks to total vehicles, the tax load were allocated to gross ton-miles on the highway, even irrespective of the hammer blow of the wheels of heavy vehicles, it would probably develop that the trucks and buses are hauling loaded and empty fully two-thirds of the ton-miles over the highways while paying but one-quarter of their proportion of highway costs.

Immediate Losses the Price of Future Profits

Undoubtedly the I.C.C. and the states themselves with their great needs for additional revenue will gradually come around to realize this, but in the meanwhile complaining about highway carriers is not getting the traffic back on the rails. Railroad rates, as is generally recognized, have been constructed to a considerable extent on what the traffic will bear. They are now being too slowly adjusted to competitive conditions, and mostly by the light of hindsight instead of by the light of foresight. If foresight were to be used promptly, it would be necessary to reduce many rates and do many things which, for the time being, might even reduce revenue but in the long run would stop further depletion of reasonably profitable tonnage. It would mean that much of the traffic would be taken off the highways by putting trailers and containers on railroad cars, by facilitating business through interchangeable containers and thus expanding markets for many commodities. To put it differently, lower freight rates, rail as well as other, reduced cost of packing and prompter delivery in better condition should cause traffic to expand.

The Co-ordinator's staff may not have been right in estimating 100 millions possible savings on l.c.l. traffic; but, anyway, they have already stimulated savings of several million dollars by arousing the interest of the carriers in the many opportunities which exist for concentrated or increased loadings. The weekly reports of carloadings show a steady decline in the percentage of l.c.l. cars loaded during approximately four years, from about 28 per cent of the weekly total to about 23 per cent. Some of this may be due to the competitors getting the business, but undoubtedly some is due to better average loadings. The preventable waste in the handling of this type of traffic is still tremendous. It still requires about 23 per cent of all carloadings to handle the l.c.l. tonnage, which aggregates about 2½ per cent of the total.

After losing about 80 per cent of their passenger revenue, the railroads have at last gotten busy first by reducing rates and then by improving service. They can do the same, with vastly greater results on net earnings, by showing a similar reawakening in dealing with their freight business. It has been generally recognized for a long time that the passenger rate of 3.6 cents per mile was prohibitive and subject to the law of diminishing returns. The recent compulsory reduction to 2 cents per mile in the East was a serious experiment, the result of which it is too early to foretell, although from preliminary reports, it appears to be a decided success in many directions. However, the Pullman rates of 3 cents per mile are probably too high compared with

the coach rates. For instance, an additional cost of about $3 per passenger between New York and Boston and New York and Washington for the privilege of riding in a car not appreciably more comportable than a day coach, which is frequently much better lighted, is excessive. The western lines have found that 2 cent rates all around produce more revenue.

Passenger Department Has Shown the Way for Freight Traffic Revival

The loss of traffic to the buses and the further potential loss to the airplanes has awakened the passenger organization sufficiently to cause them to give accelerated and improved service which is really getting the business, not only in part from buses and in part from airplanes, but to a considerable extent from the private automobile; and is also stimulating travel which would not have been undertaken but for the low rates. This success has encouraged passenger men who are now on their toes and eager to make all kinds of innovations and experiments. If the freight traffic organizations will follow this example, they will probably also succeed, and that will be followed by the working out of the rule that "Nothing succeeds like success."

Transportation is no longer a monopoly. The public has realized it; the regulating bodies and the railway managements have realized it in theory only, but have not adjusted their activities accordingly. Some railway managements appear to believe that because the motor trucks are now to be regulated that their rate structure will be protected—losing sight of the fact that private carriers on highways can probably not be regulated at all and, even if this could be done, such laws on account of their unpopularity could not be passed unless the government were operating the railroads. In that event, of course, competitors would be ruthlessly extinguished as has been done in Germany and other Continental countries.

By the light of the Co-ordinator's studies, the cost of yards and other expenses in connection with the assembling of large trains may exceed their economies. Rail carriers must aim, in order to compete with the airplane service and in order to discourage the use of private automobiles, to make thousand-mile runs between important cities practically over night and to come close to transporting people from the Atlantic to the Pacific in not much more than one day and two nights—by making the coast-to-coast run on schedules similar to those now provided between Chicago and Denver and Chicago and the Twin Cities. Freight trains carrying other than coarse commodities likewise must be operated on still faster schedules and the distribution of l.c.l. freight should probably be done largely through trailers and containers.

Success of Motor Regulation Not Yet Certain

In spite of the public appeal of the expensive Diesel-drawn trains, it will not be possible to call them a success until much more is known about their operating and depreciation costs over a long period. The bulk of the engineering fraternity connected with the railroad profession still believe that the beloved old steam engine can be operated substantially as fast and more economically than any other motive power. The problem of speedy train operation does not consist so much in running fast as in stopping fast. The brake people have made much progress and will undoubtedly accomplish more. The roadbeds and appurtenances are gradually being adjusted to the changing conditions.

It is now nearly one year since the I.C.C. acquired authority over interstate highway carriers, but very little progress has been made in regulating their status. Probably it was too big an order. It will take fully five years before this regulation will be at all effective, quite irrespective of the fact that the control of water lines and intrastate highway carriers is not included. The government subsidized Federal Barge Line is still with us. In 1935 it carried about 70,000 tons of freight over the much advertised Missouri River Improvement between St. Louis and Kansas City. The upkeep of this improvement alone, irrespective of the cost of operation, interest, etc., amounted to $10 per ton of freight, or over four times what it would have cost to ship this tonnage by railroad.

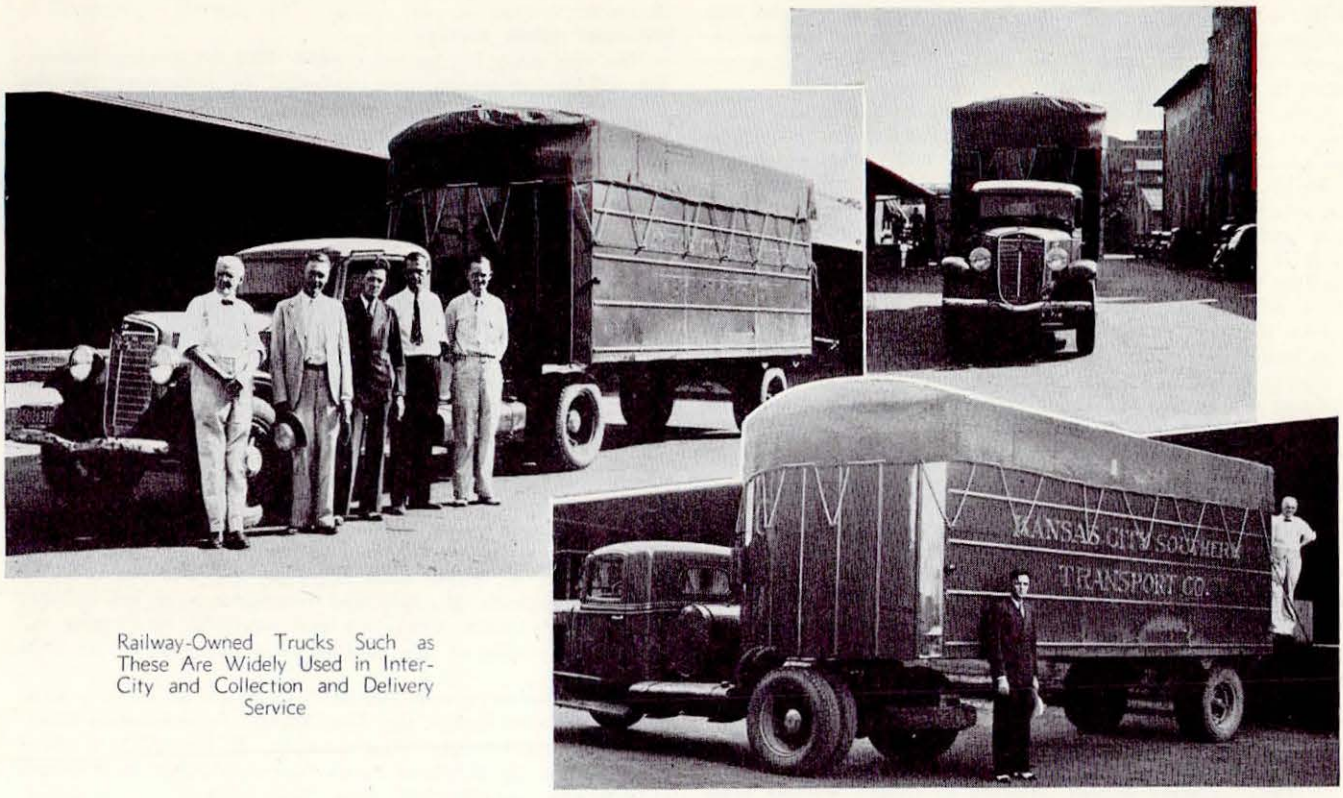
The apparently unsatisfactory prospect of lower average railroad rates can in time be turned into a greater net profit by increased volume and the elimination of needless large and small wastes. After all railroad profit always has been, and always will remain, in quantity production of transportation. The Chesapeake & Ohio and Norfolk & Western railways with the lowest ton-mile rate and probably the largest proportion of empty car mileage, are still the most profitable carriers in the country. Part of successful merchandising in any line of business is to try to push the paying lines to the utmost and to try to drop all unprofitable lines; this applies to lines of merchandise as well as to lines of railroads.

A Clearer Picture of the Transportation Situation

At present the future of transportation is clarifying. This clarification is based on the facts which are daily becoming more obvious among which are:

1. No one method of transportation has a natural monopoly.
2. The short hauls of freight and passengers will be by highway.
3. The long haul of freight and passengers must be speeded up more and more and the plant and equipment adjusted accordingly, in order to keep other carriers from too extensive an invasion of a field in which, naturally, the railroads should be pre-eminent.
4. Every effort must be directed toward a maximum revenue of dollars per passenger train- and per freight train-mile, irrespective of individual rates, but with due regard to all types of operating costs. (Nothing is gained by operating heavier trains if the savings are dissipated in heavier terminal costs).
5. Wherever possible, railway and highway transportation must be "co-ordinated" ("co-ordination" in this sense meaning maximizing the ease of interchange of traffic between rail and highway) in order to improve service to the public and reduce the expenses of the carriers and shippers.
6. In order to reduce railway operating expenses, consolidation of terminals and shops must be accelerated, and such work as accounting and the handling of money, combined and many types of facilities and business pooled; parallel trackage abandoned and joint usage substituted; substantially all branch lines earning less than $2,000 per mile gross abandoned and highway service substituted therefor.
7. Education of the public, and particularly the shippers, so they will see the monetary advantage to themselves and will thus co-operate in all these efforts instead of favoring economies in theory, but narrow-mindedly opposing them by all possible means when they are to be put into effect in their own case, like the would-be Socialist who was anxious to participate in the division of the property of everybody else but was himself unwilling to do any dividing.
8. Education of the I.C.C. and state commissions to realize that they are not dealing any longer with a

(Continued on page 216)



Railway-Owned Trucks Such as These Are Widely Used in Inter-City and Collection and Delivery Service

Speed and Efficiency in Handling Merchandise

Superintendents' Association considers all phases of efficient movement of l. c. l. traffic

Part II

THE report of the committee on merchandise handling, presented before the American Association of Railroad Superintendents in Chicago on June 17, the first portion of which was published in the *Railway Age* of August 1, continues as follows:

Pick up and delivery service has increased enormously during the past year and in every case where statistics are available it has been found that it has resulted in increased merchandise traffic. There are certain phases of the situation, however, which should be noted. This service of course should be given as wide a publicity as the fast merchandise service. The Pennsylvania, for instance, by means of a widespread advertising campaign and by the efforts of its officers and employees in acquainting the public with its pick up and delivery plan, has been quite successful in the past few years in regaining merchandise traffic.

From an operating standpoint, however, close supervision of pick up and delivery service is extremely important, for, with so many outside factors involved, such a service may well become disorganized under improper supervision, particularly at large terminals, and cause a great deal of dissatisfaction among the shippers. In this connection particular reference is made to the elaborate, but not particularly expensive, dispatching system that has been worked out by the Pacific Motor Transport Company, a wholly-owned trucking subsidiary of the Southern Pacific. In all the large centers, as well as in the smaller ones where this factor is important, the Pacific Motor Transport Company has worked out a definite schedule of regular routes to serve regular shippers. The incoming calls for pick up service from occasional shippers are handled in a central bureau which dispatches the trucks on these irregular runs but which, through experience, knows the approximate time necessary for such runs, with all due consideration to traffic conditions at various times

Trucks of This C., St. P., M. & O. Subsidiary Operate in All Sorts of Weather Conditions

of the day and other factors, and so schedules the trucks that a minimum of lost time is involved. Similar set-ups are recommended at all points where pick up and delivery service is engaged in to any great extent.

Advice has been received to the effect that the providing of pick up and delivery service at certain stations and not at others, has a vitiating effect on the plan as a whole. This is brought about by the fact that the shippers have a certain transportation set-up, either by truck or by railway, providing for all stations, and where such shippers are using the highways exclusively it is found that they object to breaking up this plan of handling traffic in order to give the railways part of the business where pick up and delivery service is available and leave the rest for the trucks. In other words, these shippers maintain that it is inefficient for them to handle their business through certain large towns by truck to reach the small towns where collection and delivery service is not provided when they might just as well load their freight for the larger towns, through which the trucks have to pass in any event, and thus cut out the railways entirely.

Two questions have arisen in connection with the provision of pick up and delivery service. One of these questions deals with the relative merits of contracting for pick up and delivery service with many draymen in one place or using one drayman exclusively. There seem to be arguments on both sides although the consensus of opinion is that with many contracts the cartage companies involved use their contacts and thus provide an important solicitation body.

Two other questions have to do with the five cents per hundred allowance for delivery or pick up by the shippers themselves. Certain roads have found this to be desirable—others advance the following objections:

Only shippers located adjacent to freight stations avail themselves of the option.

With the consequent loss of short haul traffic, the cartage companies may demand higher rates for the balance.

Such allowance may lead to requests for additional stations in competitive areas.

Without the option and with complete pick up and delivery service, it is possible to close some of the stations in larger terminals by making arrangements for direct handling by the cartage companies to and from the main station.

Simplification

In Canada and on certain intrastate business, classification and packing requirements have been simplified. The pick up and delivery tariff in Canada provides:

"Articles must be in such condition and so prepared for shipment as to render their transportation reasonably safe and practical. Each package must show the name and complete address of the consignee."

An experiment has been made in the rate structure on such shipments whereby a one-class rate, approximately equivalent to the former third class rate, with free pick up and delivery, has been successful in regaining traffic that was lost to the trucks.

Several traffic and operating officers in this country have recommended that the rigid rate structure now prevailing, which takes cognizance only of carload and less-than-carload differentials, should be changed to a differential scale providing for separate and lower rates on shipments between 4,000 and 16,000 lb. on a sliding scale. This has beeen adopted by truck companies and has proved very successful in obtaining business.

Two interesting experiments along these lines are being tried by the Canadian roads, whereby, in one territory, a shipper may ship 1,000 lb. or more, and in another 5,000 lb. or more at an all-commodity rate that is less than the all-commodity l. c. l. rate for shipments of lesser weight.

An interesting step forward along the lines of simplification has been the establishment by the Texas & Pacific of "grocery mixture" rates, intrastate in Texas, which apply one average rate on all the thousands of items included in grocery shipments. Such shipments were formerly a nightmare to bill clerks and auditors, usually requiring enormous waybills showing many items at various rates. The huge amount of paper work involved was a fruitful source of overcharge claims, and the entire proceeding was such a nuisance to the shipper that grocery shipments had largely gone over to highway competitors. Under the present system, however, the checker simply checks in so many pieces of "grocery mixture," regardless of whether these pieces are brooms or soap boxes. The waybill is prepared in the same simple fashion.

This innovation has proved popular with the grocery jobbers, and grocery shipments now represent an important item in T. & P. traffic and revenues. The system has been in effect for 18 months and not only are claim payments on grocery shipments less than they were formerly, but claims on this commodity are less than on most other commodities.

The provision of practically universal pick up and delivery service also brings up the question as to whether the free time now allowed on less-than-carload freight in freight houses may not safely be reduced from four days to the former basis of two days, with resultant economies.

Rail-Highway Co-ordination

The co-ordination of rail and highway service on merchandise traffic, it may safely be said, has made greater strides in the last 18 months than in any similar or even longer period since such operations were begun. Of particular interest is the operation of the Southern Pacific subsidiary, the Pacific Motor Transport Company, which, by undertaking a wide variety of services and taking advantage of the greater flexibility of the truck in collecting merchandise traffic from the smaller towns and concentrating it at the central point of origin and more particularly in picking up traffic at a rail head distribution point and delivering it to the smaller towns, has been successful in bringing the merchandise traffic of this railroad to a point above the 1929 level.

Other rail-highway subsidiaries throughout the country have had similar experiences, the New Haven Transportation Company being another outstanding example. In Montana, the Great Northern and the Northern Pacific have established an elaborate rail-highway co-ordination along their respective lines which has been successful despite the handicaps of the mountainous country traversed. In the southeast the Seaboard Air Line has evolved a number of truck lines which not only provide a more flexible service but also avoid many local stops that would otherwise have to be made by through trains. Several of the Texas lines have intercity truck lines that are functioning quite successfully.

Another interesting example of what may be done in the rail-highway co-ordination is the plan of the Missouri Pacific in Kansas, Missouri and Nebraska where, in addition to a large mileage of intercity truck lines along the railway, a number of cross country truck lines are operated between stations on parallel-branch lines of the Missouri Pacific, which serve only cities and towns on the Missouri Pacific, but by operating cross country between the branches and the main line avoid long delays in getting the traffic by rail off the branch lines which in many cases follow a circuitous route and involve handling through two or more terminals before reaching the main line.

Several of the railroads also have purchased large independent trucking companies and plans are now under way in a number of instances to co-ordinate the services of these trucking companies with the rail service so that by sending shipments part way by rail and part way by highway the most efficient and economical transportation may be provided for the shipper, with the inevitable resulting increase in merchandise traffic. Several of the railways which have been most successful in operations of this sort hold joint conferences between traffic and operating officers periodically to determine the advisability of truck operation in certain places and after these recommendations have been made by the district officers they are sent to the general officers for final approval. Such studies are made for the purpose of developing whether the inauguration of truck services to supplement the rail services would result in economy or improvement in service or both.

Such services were formerly handled very largely through contracts but the prevailing trend now seems to be towards actual railroad operation and ownership of the trucks. As one railroad expresses it: "Originally the contracts for handling this work were rather generally made with local trucking firms, but it developed that this was not satisfactory, and it was found preferable, particularly at the smaller stations, to have some member of our own organization handle this particular feature of the work, with the result that wherever possible we have entered into contracts with our agent or some member of the station force to handle pick up and delivery business. This gives us representatives who are personally interested in our af-

fairs, personal and direct contact with shippers and receivers of freight, and as above stated, has resulted not only in an increase in our l.c.l. business, but also, in some decrease in claim payments, and particularly has resulted in better satisfied customers."

Conclusions

Service plays a large part in controlling merchandise traffic but basically and finally the controlling feature is cost. Improved service, of course, such as studying the needs of the shipper and delivering or picking up his freight at places and times where he wants it picked up or delivered, have a cost relationship, but rates have a more direct and psychological bearing on the minds of the shippers than anything else. It is not within the province of this committee to make recommendations to the traffic departments of the railways as to what rates shall be charged on less-than-carload traffic since this is a feature that has been studied very thoroughly by the traffic departments over a long period of years. It is, however, within the province of operating officers to reduce costs by a thorough study of the methods now being employed in handling less-than-carload freight and the possibility for improving them to produce greater efficiency.

The committee suggests that present accounting arrangements seem cumbersome and costly and that simplification would reduce costs and permit a lowering of rates, not merely as an expedient dictated by competition but actually on a sound economical basis as the result of a reduction in costs. The theory that still persists in some circles that the procuring of merchandise traffic is not worth while is largely based upon the idea that the present handling, billing and accounting of merchandise traffic are so complicated and so surrounded by restrictions as to be uneconomical. Even under present conditions it is the opinion of this committee that merchandise traffic can be made a valuable adjunct of railway traffic and produce its quota of total revenues.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the first 30 weeks of this year, January 1 to July 25, was greater than that for any corresponding period since 1931, according to a statement issued by J. J. Pelley, president of the Association of American Railroads. The total was 19,416,417 cars, an increase of 2,030,816 cars, or 11.7 per cent, as compared with the total for the corresponding period of 1935, but a decrease of 2,628,000 cars, or 11.9 per cent, as compared with the corresponding period in 1931. Miscellaneous freight showed an increase of 15.6 per cent, while merchandise showed an increase of only .4 per cent.

Loading for the week ended July 25 totaled 731,062 cars, a new peak for the year and an increase of 135,490 cars, or 22.7 per cent, above the corresponding week of 1935 and an increase of 10,660 cars, or 1.5 per cent, over the figures for the week before. Grain and grain products and coke showed decreases as compared with the week before but all commodity classifications showed increases over last year. The summary, as compiled by the Car Service Division of the Association of American Railroads, follows:

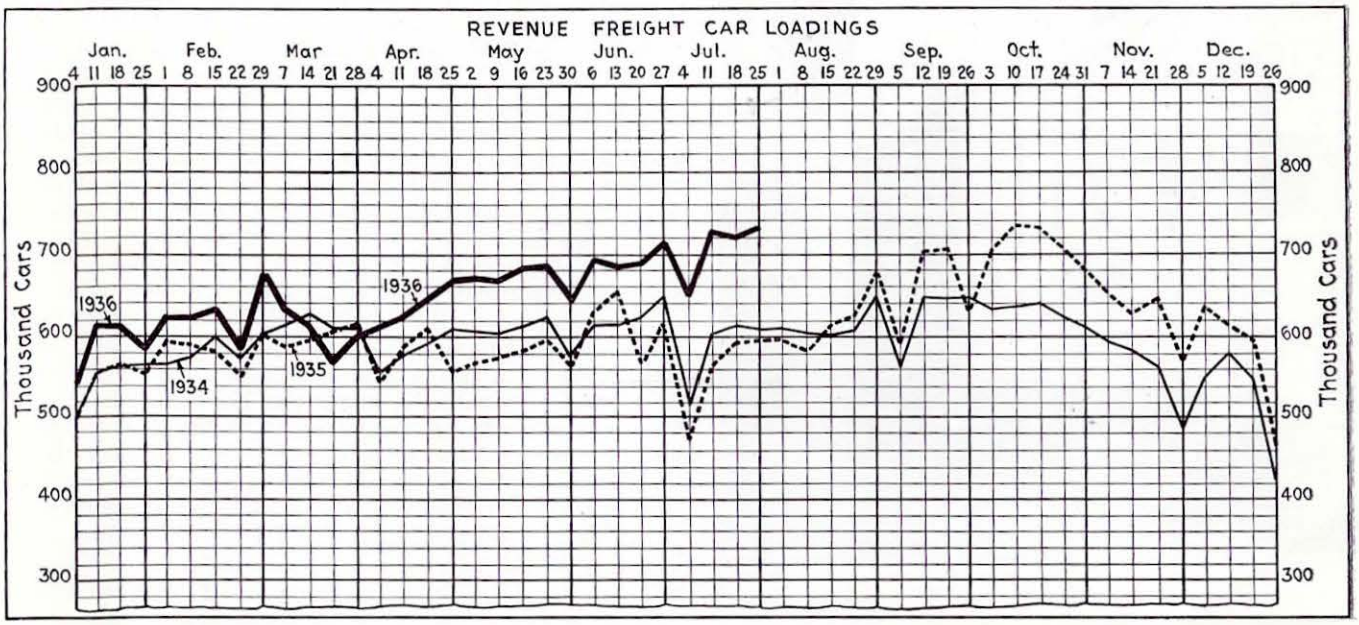
Revenue Freight Car Loading
For Week Ended Saturday, July 25

Districts	1936	1935	1934
Eastern	152,781	129,458	130,513
Allegheny	147,996	116,841	113,255
Pocahontas	49,785	43,433	42,861
Southern	95,124	79,228	80,348
Northwestern	121,183	88,912	95,701
Central Western	108,952	89,822	97,302
Southwestern	55,241	47,878	50,062
Total Western Districts	285,376	226,612	243,065
Total All Roads	731,062	595,572	610,042
Commodities			
Grain and Grain Products	55,022	33,357	43,627
Live Stock	13,648	9,672	26,295
Coal	112,946	102,916	101,670
Coke	8,612	4,560	4,528
Forest Products	34,700	28,682	21,713
Ore	55,174	34,700	30,803
Merchandise L.C.L.	162,337	154,978	158,514
Miscellaneous	288,623	226,707	222,892
July 25	731,062	595,572	610,042
July 18	720,402	592,672	616,040
July 11	724,324	565,502	604,192
July 4	649,759	471,126	520,741
June 27	713,639	616,863	646,003
Cumulative Total, 30 Weeks	19,416,417	17,385,601	17,787,638

Car Loading in Canada

In Canada, in the week ended July 25, car loadings totaled 44,706, as compared with 45,496 in the preceding week and 43,342 a year ago, according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
July 25, 1936	44,706	21,984
July 18, 1936	45,496	21,280
July 11, 1936	47,912	21,251
July 27, 1935	43,342	18,458
Cumulative Totals for Canada:		
July 25, 1936	1,307,112	698,466
July 27, 1935	1,288,124	654,002
July 28, 1934	1,268,632	679,497



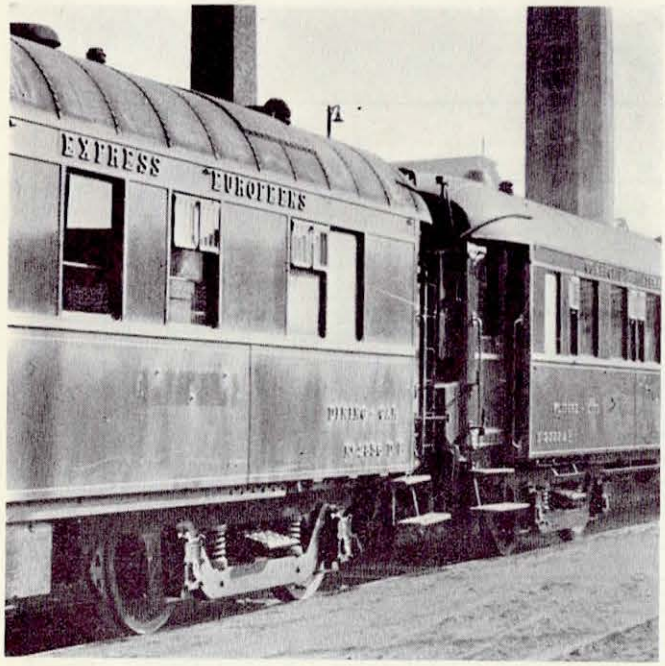
A Swedish Car of 1933 with New Twelve-Foot Wheelbase Trucks, Longitudinal Bolster Springs and Triple Spring Suspension

Riding Qualities of Passenger Cars

Knowledge of harmonic vibrations essential for correct design—Why European roads are discontinuing American type trucks

By A. Giesl-Gieslingen

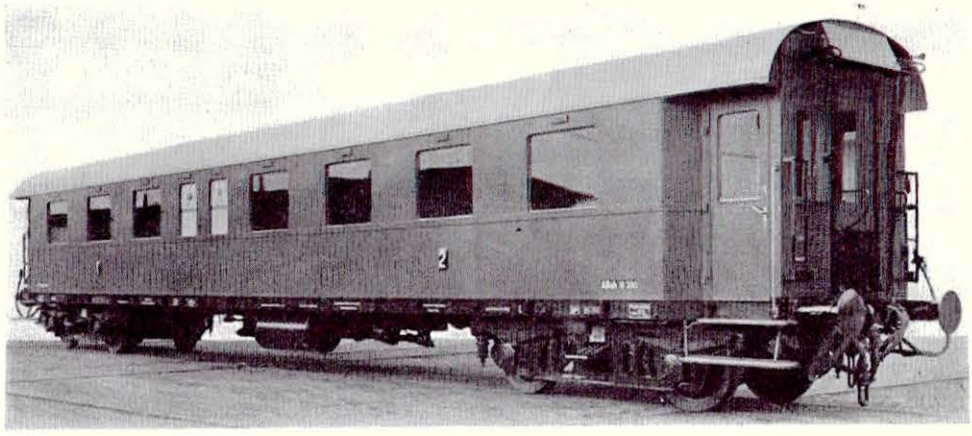
OBSERVATION as well as comments from the traveling public show unmistakably that, broadly speaking, we are now confronted with a serious problem in matching the riding comfort of our cars with the rapid advances in speed and streamlining, air conditioning and interior decoration. This is particularly true of cars mounted on four-wheel trucks.



American Type Passenger Trucks Under Modern Cars of the International Sleeping Car Co., Paris, In Use Since Shortly After the War

The most common inconveniences are sustained vibrations (rattling), vertical oscillations with a frequency of between 2.5 and 3, often induced by rail joints and, last but not least, jerky side motions even on straight track which often make it impossible to walk through the aisle without bracing oneself against the seats. We cannot dispose of these conditions by blaming the permanent way because one can observe them on track which is so reasonably good that insisting on higher standards of maintenance would be too costly. It is the duty of the truck and the body suspension to convert any sudden jerk to which a wheel may be subjected into a body motion which will not be annoying. There is no reason why this should not be possible, as long as we limit the initial disturbances received by a wheel to amplitudes of ½-in. to ¾-in. which values need not be exceeded on "good" track. The broad question is, however, whether the present offenses are due to accidental defects of design or whether the standard American four-wheel equalizer truck and body suspension is inherently unsuited to respond to the requirements of today.

For the comfort of those who operate such trucks in large numbers, it can be said that greatly improved riding is often obtainable by simple changes in details only. This appears to be proved by recent trains such as the Mercury of the New York Central. For instance, let us take the following actual observations: A certain passenger car, when striking a poor rail joint, made three to five quite distinct vertical oscillations with a natural frequency of 2.5 per second. When the speed reached 56 m.p.h. on 33-ft. rails, resonance was established and even on the best track there were continuous oscillations.



A 1930 Austrian Car with Older Type of Central European Truck, Having Crosswise Bolster Springs, but Triple Spring Suspension

Now the curious thing was that, standing up and making so simple an experiment as holding a pencil with the outstretched arm against a paper on the wall, one could see that the amplitude of the car body was small, hardly more than ⅛-in., making a total vertical movement of ¼-in.; but sitting down one appeared to jump on one's seat by more than one inch in a most annoying manner. Another simple test cleared up the reason for that. If one let oneself drop on the seat cushion, the resulting oscillations induced by the cushion springs were of the same frequency of 2.5 per sec. as those of the car body. Thus, the resonance with the rail joints made the car body oscillate with moderate amplitude, but the seat cushion, instead of performing its function of providing comfort, established resonance with the average passenger's body mass and acted as an amplifier.

This is a typical example of conditions which can easily be eliminated without any basic change in truck design. In designing a new car, such detrimental effects can be avoided by properly co-ordinating the timing of all possible harmonic oscillations, and the burning of a moderate amount of midnight oil will pay large dividends. We have now reached a development in railroading where the theory of vibrations can no longer be disregarded in favor of cut-and-try methods. The latter are too costly.

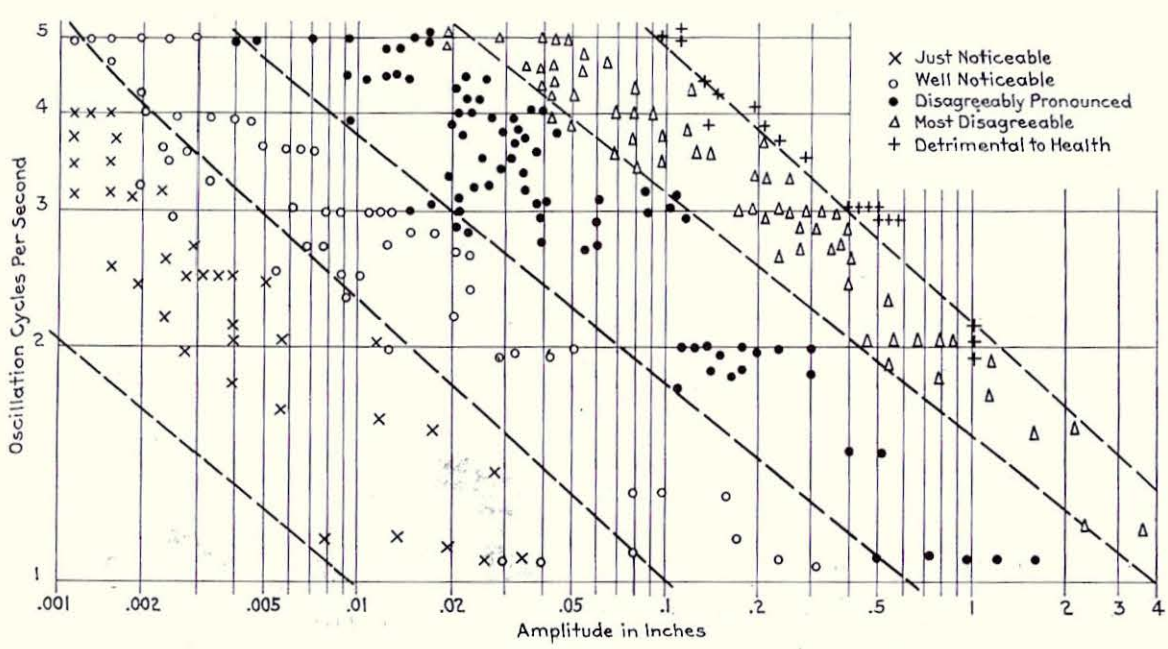
The question of what constitutes an uncomfortable vertical motion has been widely covered by recent German tests,* the results of which are reproduced in part. The chart is self-explanatory and very useful for design purposes.

The maximum lateral acceleration above which one cannot hold one's balance unaided while walking through a car aisle has, so far as the author knows, not been scientifically determined, but from a simple home-made test he would conclude that one-tenth of gravity constitutes the limit. Then we have to place the centers of our feet about 20-in. apart laterally while walking. An unavoidable lateral force of 0.1 gravity will also be exerted if curves having a superelevation of 5 in. are negotiated at a speed of

$$\frac{125}{\sqrt{\text{degrees}}} \text{ m.p.h.}$$

(that is, 72 m.p.h. for a three-deg. curve) which may constitute a suitable practical limit, somewhat above usual regulations but often reached in service. Lateral is used here to mean parallel to the car floor. If the car leans outward to any appreciable extent under the influence of the centrifugal force, then this lateral component may be considerably increased, which should of course be avoided. From these considerations we may conclude that the car-body suspension should be able to compensate any side movement of the wheels in such a way that a lateral force of well below 0.1 gravity is

* Zeitschrift des Vereines deutscher Ingenieure, February, 1936.



Physiological Effect of Vertical Oscillations According to Reiher and Meister

exerted on the car body. In contrast to this we can observe side jerks of 0.15 and 0.2 gravity on modern equipment, and no wonder the passenger complains that he has difficulty in walking to the dining car, which has been redecorated and air-conditioned for his comfort.

The conventional bolster suspension links are provided to permit relative lateral motion between truck and car body and to control lateral forces. For softer action of these links, the British Gresley compound bolster has come into use on a few recent high-speed trains in this country. It is reasonable to expect, however, that we should start cushioning the lateral shocks where they originate, namely, by providing controlled lateral motion between axle and truck frame.

Interesting light is cast upon the question of spring selection by the fact that the disagreeable vertical oscillations of the car previously mentioned were caused almost exclusively by the action of the helical equalizer springs. The laminated bolster springs practically failed to participate, or else the natural frequency would have been much lower. Now, the combination of laminated and helical springs in series is ordinarily credited with the advantage of providing effective damping by the internal friction of the former. But if that friction is so high that the helical springs may set up disturbing oscillations without bringing the other spring into play, then there is no damping effect. The frictional resistance in a semi-elliptic spring may be calculated as follows:

$$R = P \frac{2t}{l} (n-1)\ u$$

where R ..... resistance in lb.
P ..... load upon spring in lb.
t ..... thickness of leaves in in.
l ..... length between end suspensions in in.
u ..... coefficient of friction between adjoining leaves = 0.28 for perfectly greased springs to 0.6 for dry springs (leaves not ground in either case).

For conventional bolster springs we shall find that $R = \frac{u}{8}$ and since the springs are likely to be dry in average service, a vertical force of 7½ per cent of the car-body weight may act before these springs come into play at all. This causes discomfort. Moon* concludes that the friction of laminated springs is valuable only if it does not exceed about 3½ per cent. It can be reduced to that amount without resorting to expensive measures, by making the springs long, with correspondingly thicker leaves. This has been done extensively in Europe. Then, the springs cannot be put crosswise under the bolster as in the usual American design but they have to be located lengthwise, which leads us away from the conventional four-wheel equalizer truck now standard in this country. The lengthwise bolster spring, 80-in. long and over, on a Swedish car exhibited in Brussels in 1935, which is shown in one of the photographs, is of German origin. Incidentally, it transmits the load to the truck frame near to the axles and consequently permits the use of a long wheel-base of 12 ft., which is so essential to smooth riding, without the excessive weight which a lengthened standard truck would require. These bolster springs can also be given a wide crosswise spacing.

These short notes will have served their purpose if they help to open discussion of the vital subject of truck design. Much can be done to improve existing trucks; but the whole problem should be thrown open without adherence to what are not standard forms. For instance, the American equalizer truck gained wide favor in Europe twenty years ago, even on the old State Railways of Prussia, because it proved to be superior to what was then the practice over there. But in recent years, after exhaustive tests, it has been replaced by the design installed under the Swedish car here illustrated. This is another indication that we should not be satisfied with what we have.

* Journal, Institute of Locomotive Engineers, 1928, No. 83, p. 15.

A Necessity in Price Competition

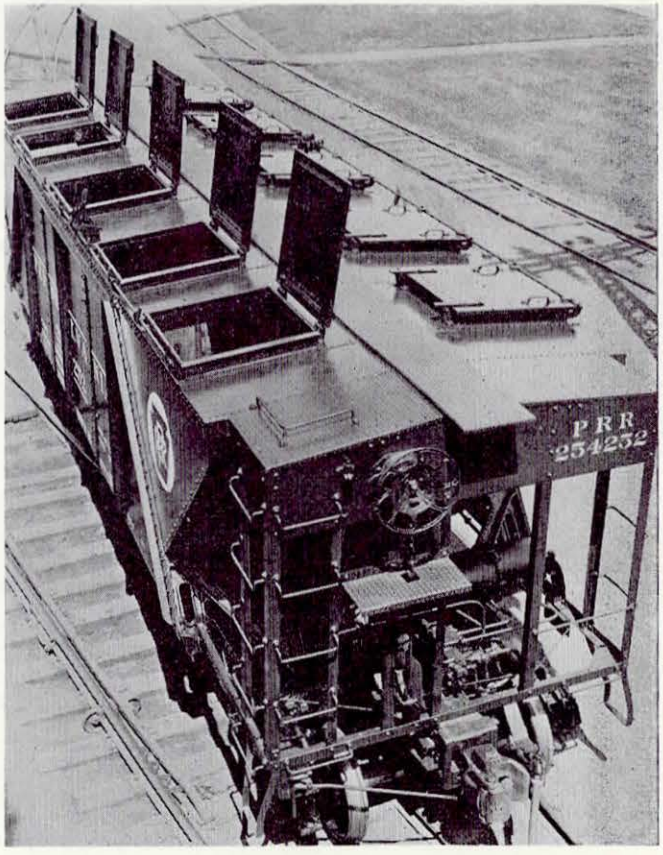
(Continued from page 210)

monopoly, and thus to change their mental attitude so they will not always construe any doubtful question against the carriers. (Obviously if the railroad security holders have to suffer from obsolescence, it is no injustice for individuals who have invested capital along obsolete branch lines also to lose).

It takes courage to be a realist. Those who are courageous and will face the facts, however unpleasant they may at first appear, and act upon them will reap large rewards, just as did those who rebuilt the outstanding railroad wrecks of the 1890's as, for example, the Norfolk & Western, Union Pacific and Santa Fe.

Where there is no vision the people perish! There appears to be no vision in Congress in connection with transportation matters. Unless such vision can be injected into our legislators by railroad management and by enlightened public opinion, complete government ownership with complete loss of money invested in railraad stocks and most of the money invested in railroad bonds is inevitable. But clarity and reality in facing facts, tough-minded analysis of them—and then vigorous action—by management is the first essential. Quite likely it is the *only* essential.

* * *



One of 400 Covered Hopper Cars for Cement Service Equipped with Alan Wood Super-Diamond Pattern Rolled Steel Plate Walkways and Brake Steps. In This Particular Construction the Lateral and Longitudinal Walkways Are Part of the Roof

I.C.C. Reports on Passes

Comprehensive statistical summary given by Bureau of Statistics without conclusions

WASHINGTON, D. C.

CLASS I railroads in the first quarter of 1936 issued 3,074,586 passes, of which 2,218,261 were term and 856,325 were trip passes, for use during the year, according to a report of the Bureau of Statistics of the Interstate Commerce Commission of an inquiry undertaken for the purpose of obtaining a comprehensive statistical summary of the extent to which free transportation is accorded to various classes of persons to which the railroads are authorized to issue passes by the provisions of the interstate commerce act and in order to bring about greater uniformity in the records in which such statistics are kept.

Approximately 96 per cent of the total number of passes were issued to railroad officers and employees and members of their families, the report shows, and the Pennsylvania, which issued the largest aggregate number, issued 1.04 per $1,000 of operating revenues, 84 per cent of them to its own employees.

Because the reports submitted covered only the first quarter of the year, no attempt was made to draw any general conclusions as to the relative generosity of the various railroads in the matter of free transportation and it was pointed out that it was not possible to determine accurately the amount of free transportation handled by the railroads from the number of passes issued because some railroad officers receive a considerable number of term passes, some of which are never used, although some are used very frequently. The Passenger Traffic Report issued in 1935 by Co-Ordinator Eastman's Section of Transportation Service had included an estimate that the passenger transportation furnished gratis was equivalent to at least $50,000,000, but the bureau's report makes no attempt to give any such estimate.

For the twelve roads which issued the largest aggregate number of passes the total number issued per 1,000 revenue passengers carried in 1935 (excluding commutation) ranged from 8 to 67.

Attention is called to the fact that in considering the total number of free passes issued and requested, or the ratio of term to total passes, it should be kept in mind that the term passes reported for the first quarter probably represent approximately 90 to 95 per cent of the total to be issued for the whole year but that the trip passes reported for the first quarter may be less than 25 per cent of the total to be issued for the year since the first three months are not the most desirable time for vacation traveling.

Of the 3,074,586 passes issued, 2,070,827 were issued to employees of the reporting carrier and their dependents and 871,267 were issued to employees of other carriers and their dependents.

The purpose of the inquiry is explained in a quotation from the annual report of the commission to Congress for 1935 as follows:

"Under Section 1 (7) of the Interstate Commerce Act carriers subject to the provisions thereof, in certain cases are permitted to issue or give free tickets, free passes, or free transportation, as well as to the interchange same with other carriers subject to certain provisions contained in the statute. In order to secure greater uniformity in the various classes into which carriers now are keeping statistics of the number of passes issued an inquiry is in progress to determine the extent to which carriers are issuing passes and free tickets. Certain records are kept by carriers in accordance with our regulations governing the forms and recording of passes, but a comprehensive statistical summary of the extent to which free transportation is accorded to various classes of persons heretofore has not been attempted."

On November 13, 1935, the commission issued an order requiring the Class I steam railways and the Pullman Company to report quarterly the free transportation issued and requested for use during 1936 (but not thereafter unless further ordered) according to a schedule form supplied the roads. The order was not served on switching and terminal companies because very few of them operate any passenger service and issue any passes.

In response to the inquiry of the commission, 117 reports, representing 140 Class I railways, and reports from the Pullman Company and the state of New Jersey respectively were submitted and tabulated. Because some of the reports were filed on a system basis, they also covered 26 Class II roads, 7 Class III roads, and 2 switching and terminal companies. The returns by certain of the roads in the United States controlled by Canadian carriers (Canadian National Lines in New England, Grand Trunk Western Railroad Company, Canadian Pacific Lines in Vermont, International Railway Company of Maine) were not tabulated because they were not comparable with the other reports submitted. All the passes good over all the Canadian lines in Canada and certain major divisions were also good over the controlled lines in the United States mentioned above. Consequently, the reports of these carriers include all passes good over them irrespective of whether the holder is employed on the road in question or on the lines in Canada.

Following is an abstract of the report, which summarizes several accompanying statistical tables:

Analysis of Returns to Commission Inquiry

The total number of passes issued prior to April 1, 1936 for use during the year ended December 31, 1936 was 3,074,586, of which 2,218,261 were term and 856,325 trip passes. They were divided among the following groups:

Class of recipient	Number of passes issued — All kinds — Number	Per cent of total issued	Term	Trip
Carrier officers, employees and their families	2,942,094	95.7	2,131,744	810,350
Livestock caretakers and others provided for in published tariffs	22,431	.7	54	22,377
Contractors engaged in work for respondent railways	14,164	.5	8,879	5,285
Government officials*	15,501	.5	15,070	431
Eleemosynaries, clergy, educators, etc.	24,779	.8	16,365	8,414
Directors, local counsel and surgeons, and all others	55,617	1.8	46,149	9,468
Total	3,074,586	100.0	2,218,261	856,325

* Employees of Federal, State, and municipal governments.

The number of passes issued by Class I roads as a group to employees of other Class I roads (455,930 term and 234,051 trip passes) exceeds the number requested (329,307 term and 225,668 trip passes). This excess, which represents passes issued without request, is 28 per cent of the term and 4 per cent of the trip passes issued.

The total number of passes issued by Class I railways, mentioned above, includes 917 term passes issued by the state of New Jersey to certain public officials in accordance with Chapter

120, Laws of 1934 of the state of New Jersey. These passes are good within the borders of the state on all the railways operated within it. New Jersey is the only state which issues passes direct instead of requesting them from the railways.

The Pullman Company issued 23,178 passes, of which 15,366 were term and 7,812 trip passes. These passes granted the holders free use of various types of Pullman facilities such as rooms, berths, and seats.

1. Total number of passes issued to all persons per $1,000 of railway operating revenues

The ratios for the twelve roads which issued the largest aggregate number of passes are as follows:

Railway	Total number of passes issued—Aggregate	Total number of passes issued—Per $1,000 operating revenues for year 1935
Pennsylvania	383,226	1.04
New York Central System	262,922	.77
Atchison, Topeka & Santa Fe System	137,362	1.01
Baltimore & Ohio*	126,602	.88
Missouri Pacific Lines	91,409	.95
Louisville & Nashville	90,104	1.19
Southern Pacific (Pacific Lines)	88,210	.69
Chicago, Rock Island & Pacific†	86,686	1.29
Chicago, Burlington & Quincy	86,022	1.04
Illinois Central System	84,978	.86
Chicago & North Western‡	73,233	.79
Chesapeake & Ohio	70,923	.62

* Includes Staten Island Rapid Transit.

† Includes Chicago, Rock Island & Gulf.

‡ Includes Chicago, St. Paul, Minneapolis & Omaha.

Among all the roads which operate passenger trains, the ratio ranges from 0.26 passes per $1,000 railway operating revenues for the Atlanta, Birmingham and Coast Railroad Company to 3.97 for the Burlington-Rock Island Railroad Company. About two-thirds of the passenger carrying railways have averages ranging between 0.6 and 1.4 passes per $1,000 of railway operating revenues, as shown in the following table:

Total number of passes issued to all persons per $1,000 of railway operating revenues for year 1935	Number of railways* in each class
0.2—0.5	11
0.6—0.9	36
1.0—1.3	27
1.4—1.7	11
1.8—2.1	5
2.2—2.5	5
2.6—2.9	2
3.0 and over	3
Total	100*

* For purposes of this tabulation the 17 railways which reported issuance of passes but do not operate passenger trains are excluded.

2. Total number of passes issued to all persons per 1,000 revenue passengers carried

The total number of passes issued to all persons per 1,000 revenue passengers carried (excluding commutation) has been suggested as a measure for comparison instead of the ratio of nonrevenue to revenue passenger miles (which is not available). However, it should be kept in mind that the number of passes issued is an imperfect measure of the use made of those passes.

Roads which have a relatively low ratio of passenger to total railway operating revenues generally issue a larger number of passes per 1,000 revenue passengers carried than roads with a relatively high ratio of passenger to total traffic. This relationship, however, is modified by such factors as the policy of the various carriers and the usefulness of transportation over their lines. For the twelve roads which issued the largest aggregate number of passes, the averages are as follows:

Railway	Total number of passes issued to all persons per 1,000 revenue passengers carried in year 1935 (excluding commutation)	Per cent passenger of total railway operating revenue for year 1935
Southern Pacific (Pacific Lines)	8	14
Illinois Central System	9	9
Pennsylvania	13	16
Chicago & North Western	16	11
Baltimore & Ohio	17	7
New York Central System	19	16
Louisville & Nashville	23	8
Chicago, Burlington & Quincy	27	8
Missouri Pacific Lines	42	6
Chicago, Rock Island & Pacific	52	9
Atchison, Topeka & Santa Fe System	61	10
Chesapeake & Ohio	67	3

The number of passes per 1,000 revenue passengers for all Class I roads operating passenger trains varies from 1 for the Long Island Railroad Company, which has a very high ratio of passenger to total railway operating revenues, to 734 for the Wheeling and Lake Erie Railroad Company, which has a very low ratio. More than half of such roads issued less than 40 passes per 1,000 revenue passengers as shown in the following table:

Total number of passes issued to all persons per 1,000 revenue passengers in year 1935 (excl. commutation)	Number of railways in each class
0— 19	24
20— 39	27
40— 59	16
60— 79	10
80— 99	9
100—119	3
120—139	3
140—159	..
160—179	1
180—199	3
200 and over	4
Total	100

3. Total number of passes issued to all persons per employee of issuing carrier

A comparison between the total number of passes issued to all persons and the number of employees of the issuing carriers is probably the best relative measure of the generosity of the various railroads in issuing passes when allowance is made for variation in the ratio of term to total passes.

Ninety-six per cent (96%) of all the passes issued before April 1, 1936, for use in 1936 were given to the employees and their dependents of either the respondent railroad or of other carriers. One of the factors determining the number of passes issued to other carriers seems to be the number of passes received from those carriers (which is affected by the number of employees of the respondent railroad).

For the twelve roads which issued the largest aggregate number of passes, the averages are as follows:

Railway	Total number of passes issued to all persons per employee of issuing carrier for year 1935
Chicago & North Western	2.4
Southern Pacific (Pacific Lines)	2.4
New York Central System	2.7
Illinois Central System	2.9
Chesapeake & Ohio	3.0
Missouri Pacific Lines	3.1
Atchison, Topeka & Santa Fe System	3.3
Baltimore & Ohio	3.5
Chicago, Burlington & Quincy	3.5
Pennsylvania	3.6
Louisville & Nashville	3.8
Chicago, Rock Island & Pacific	4.0

For all railways operating passenger trains the total passes issued to all persons per employee vary from 0.5 for the Atlanta, Birmingham and Coast Railroad Company to 13.8 for the Burlington-Rock Island Railroad Company. Sixty per cent (60%) of such roads issued between 2.0 and 4.0 passes to all persons per employee as shown in the following table:

Total number of passes issued to all persons per employee of the issuing carrier for year 1935	Number of railways in each class
0.0—0.9	2
1.0—1.9	4
2.0—2.9	29
3.0—3.9	31
4.0—4.9	17
5.0—5.9	5
6.0—6.9	4
7.0—7.9	2
8.0—8.9	3
9.0 and over	3
Total	100

4. Ratio of number of term to total passes issued to all persons

As previously explained, the term passes reported probably represent approximately 90 to 95 per cent of the total to be given for the whole year, while the trip passes may be less than 25 per cent of the annual total. For the twelve roads which issued the largest aggregate number of passes, the ratios are as follows:

Railway	Ratio of number of term to total passes issued to all persons (per cent)
Louisville & Nashville	52
Southern Pacific (Pacific Lines)	54
Chicago, Burlington & Quincy	60
Missouri Pacific Lines	63
Chicago & North Western	63
Atchison, Topeka & Santa Fe System	64
Illinois Central System	64
Pennsylvania	73
New York Central System	74
Baltimore & Ohio	75
Chicago, Rock Island & Pacific	79
Chesapeake & Ohio	81

For all roads operating passenger trains, the percentages of term passes to total passes issued to all persons vary from zero for the Atlanta, Birmingham and Coast Railroad Company and the Georgia Railroad to 100 per cent for the Lehigh and Hudson Railway and the Lehigh and New England Railroad Company.

More than half of all such roads had figures between 70 and 90 per cent as shown in the following table:

Ratio of number of term passes to total passes issued to all persons (per cent)	Number of railways in each class
0— 9	3
10—39	—
40—49	2
50—59	4
60—69	17
70—79	26
80—89	28
90—99	18
100	2
Total	100

5. Ratio of number of passes issued to carriers' own employees and their dependents to total passes issued to all persons

Sixty-seven per cent (67%) of all passes issued by respondent railways to all persons were given to their own employees and their dependents. For the twelve roads which issued the largest aggregate number of passes, the ratios are as follows:

Railway	Number of passes given by respondent to its employees and dependents, per 100 of the total passes issued to all persons
Pennsylvania	84
Chesapeake & Ohio	77
New York Central System	77
Atchison, Topeka & Santa Fe System	75
Louisville & Nashville	75
Baltimore & Ohio	74
Southern Pacific (Pacific Lines)	72
Illinois Central System	70
Missouri Pacific Lines	68
Chicago, Burlington & Quincy	67
Chicago & North Western	65
Chicago, Rock Island & Pacific	65

The ratios for all roads operating passenger trains vary from 16 employee passes per 100 passes issued to all persons for the Burlington-Rock Island Railroad Company to 86 for the Bessemer & Lake Erie Railroad Company. The individual road percentages may be classified as follows:

Number of passes given by respondent to its employees and dependents, per 100 of the total passes issued to all persons	Number of railways in each class
10—19	1
20—29	5
30—39	15
40—49	17
50—59	20
60—69	22
70—79	16
80—89	4
Total	100

6. Number of term passes issued to employees and their dependents per employee

It should be remembered that employee passes are issued not only to employees included in the wage statistics furnished the commission but also to superannuated, pensioned, furloughed, and retired employees and their dependents, and the dependents of deceased employees. Furthermore, as previously explained, the term passes reported probably represent approximately 90 to 95 percent of the total to be given for the whole year, while the trip passes may be less than 25 per cent of the annual total.

For the twelve roads which issued the largest aggregate number of passes, the ratios are as follows:

Railway	Number of term passes issued by respondent to its employees and their dependents per employee
Southern Pacific (Pacific Lines)	0.9
Chicago & North Western	1.0
Illinois Central System	1.3
Missouri Pacific Lines	1.3
Chicago, Burlington & Quincy	1.4
Louisville & Nashville	1.5
Atchison, Topeka & Santa Fe System	1.6
New York Central System	1.7
Chesapeake & Ohio	1.9
Baltimore & Ohio	2.0
Chicago, Rock Island & Pacific	2.2
Pennsylvania	2.3

The individual ratios for the roads operating passenger trains may be classified as follows:

Number of term passes issued by respondent to its employees and their dependents per employee	Number of railways in each class
0.0—0.3	3
0.4—0.7	6
0.8—1.1	17
1.2—1.5	32
1.6—1.9	22
2.0—2.3	12
2.4—2.7	5
2.8 and over	3
Total	100

7. Ratio of number of term passes to total passes issued by respondent railways to their employees and their dependents

This ratio also is affected as previously explained by the fact that the number of term passes will nearly equal that for the entire year, while the number of trip passes for the first quarter will probably be less than 25 per cent of the year's total. However the ratios are interesting for comparative purposes.

For the twelve roads which issued the largest aggregate number of passes, the ratios are as follows:

Railway	Number of term passes per 100 of total passes issued by respondent to its employees and their dependents
Louisville & Nashville	52
Southern Pacific (Pacific Lines)	54
Chicago, Burlington & Quincy	60
Illinois Central System	64
Missouri Pacific Lines	64
Chicago & North Western	65
Atchison, Topeka & Santa Fe System	65
Pennsylvania	76
Baltimore & Ohio	76
New York Central System	81
Chesapeake & Ohio	81
Chicago, Rock Island & Pacific	85

The percentages for all roads operating passenger trains vary from zero for the Atlanta, Birmingham & Coast Railroad Company, Atlanta and West Point Railroad, and Georgia Railroad to 100 per cent for the Lehigh & New England Railroad Company and Lehigh Valley Railroad Company. More than half of such roads had figures between 80 and 99 per cent. The individual road percentages may be classified as follows:

Number of term passes per 100 of total passes issued by respondent to its employees and their dependents	Number of railways in each class
0—9	3
10—19	..
20—29	1
30—39	..
40—49	1
50—59	9
60—69	16
70—79	16
80—89	32
90—99	20
100	2
Total	100

8. Ratio of number of passes issued to employees (and their dependents) of other Class I railroads, to passes requested from such carriers

The number of passes issued by any road to employees of other roads seems to be influenced by the following factors:

(a) The activity of the issuing road in matters of free transportation;

(b) The relative number of passes received in exchange;

(c) The usefulness of transportation on the issuing road.

For the twelve roads which issued the largest aggregate number of passes, the ratios are as follows:

Railway	Number of passes issued to other Class I roads per 100 passes requested from such carriers*
Southern Pacific (Pacific Lines)	131
Louisville & Nashville	130
Chicago & North Western	128
Chicago, Burlington & Quincy	121
Chicago, Rock Island & Pacific	118
Pennsylvania	110
Baltimore & Ohio	109
Chesapeake & Ohio	100
New York Central System	97
Atchison, Topeka & Santa Fe System	87
Illinois Central System	82
Missouri Pacific Lines	73

* Covers only passes issued and requested for employees and dependents of Class I steam railways other than switching and terminal companies.

For all roads operating passenger trains the passes issued to other Class I roads per 100 passes requested varies from 43 for the Chicago & Illinois Midland Railway Company to 1,337 for the Alabama Great Southern Railroad Company. Twenty-one per cent (21%) of such roads issued fewer passes than they requested, while the rest issued as many or more, as shown by the following table:

Number of passes issued to other Class I roads per 100 passes requested from such carriers*	Number of railways in each class
0— 49	2
50— 99	19
100—149	35
150—199	19
200—249	4
250—299	9
300—349	3
350—399	2
400—449	1
450—499	1
500 and over	5
Total	100

* Covers only passes issued and requested for employees and dependents of Class I steam railways other than switching and terminal companies.

NEWS

Research Advancing Rail Transport, Says Wallace

Sees industry on threshold of one of most active and fruitful eras in its history

Research advancing rail transportation is proceeding on a vast scale, according to L. W. Wallace, director of the Division of Equipment Research of the Association of American Railroads, who declared in a recent statement that "the railroad industry stands on the threshold of one of the most active and fruitful eras of its history." Pointing out that the railroads are purchasers of more than 70,000 commodities, Mr. Wallace asserted that through the network of relationships built up around the transportation system of the United States a very large research personnel is working directly and indirectly in behalf of the railroad industry.

"These many relationships," he continued, "mean that of the hundreds of millions of dollars spent annually for research by such industries as the steel, chemical, electric, textile, railway supply, and others, a measurable amount is spent directly in response to the needs of the railroad industry. In the last analysis the railroad industry pays a measurable amount of the cost of such research as is devoted to developing the commodities it uses in the price it pays for such commodities.

"These facts are not generally known or are purposely disregarded by many who proclaim that the railroads are moribund. Evidently there is either a misunderstanding of the appropriate place of the railroad industry in the research pattern or lack of a rational conception of what constitutes research. Actually, there is a seething ferment of thought and action among railroad executives and scientists, engineers and other employees connected with the industry. They are eager to apply any new procedure which will enable the railroads to make available better transportation. Economy, efficiency, comfort, dependability, and safety are the aims sought.

Mr. Wallace points out that the Division of Equipment Research is now functioning as a co-ordinator of research effort. Better correlation and more definite integration, he reports, are being attained among the many agencies enlisted in railway advancement.

"The place of the railroad industry in the research pattern is essentially and necessarily applied research," Mr. Wallace explains. "This is also true of all others who purchase materials and equipment for their individual use in the sense the railroads do. The sum spent by both the railroad and railway supply industries annually for research is very large and is undoubtedly as large as that of many other industries. Even such a total would not include a reasonable proportion of the creative research expenditures of that long and important list of industries which sell commodities to the railroad industry. The amount spent for creative research in the development of the vast number of commodities which the railroads buy and use must be rather staggering.

"The Division of Equipment Research realizes that it would be thoroughly impracticable and inadvisable to have a staff and laboratory facilities adequate in size and quality to deal with the great number of research problems which it will be expected to and must consider. The Division will therefore maintain a relatively small staff and will purchase only such special equipment as may be needed and not available in some laboratory. As each problem arises it will enlist the services of the best talent and facilities available for such research. Thus there will continue to be brought to bear upon the railroad research problems the highest degree of scientific and professional talent. Today two of the leading metallurgical research institutions are working on problems assigned to them. Three of the large technical institutions are likewise working on assigned problems. The research program on the air conditioning of railroad passenger cars recently authorized is being so organized that the best research facilities of manufacturers, railroads, and technical universities will be used."

Enumerating other research tasks of the railroads, Mr. Wallace describes the development of the locomotive, stressing the possibilities of the more recently constructed locomotive laboratories of the University of Illinois and the Pennsylvania Railroad.

Six Months Railway Net a 2.22 Per Cent Return

$238,243,934 compares with $194,776,454 or 1.81 per cent in first half of 1935

Class I railroads for the first six months of 1936 had a net railway operating income of $238,243,934, which was at the annual rate of return of 2.22 per cent on their property investment, according to reports compiled by the Bureau of Railway Economics of the Association of American Railroads. In the first six months of 1935, their net railway operating income was $194,776,454, or 1.81 per cent on their property investment.

Operating revenues for the first six months totaled $1,872,928,867, compared with $1,635,535,933 for the same period in 1935, an increase of 14.5 per cent. Operating expenses amounted to $1,421,381,428, compared with $1,259,945,852 for the same period in 1935, an increase of 12.8 per cent.

Class I railroads in the six months paid $148,668,143 in taxes, compared with $121,312,664 in the same period in 1935, or an increase of 22.5 per cent. For the month of June alone, the tax bill amounted to $26,842,213, an increase of $6,390,818 or 31.2 per cent above June, 1935.

Twenty-seven Class I railroads failed to earn expenses and taxes in the first six months of 1936, of which 9 were in the Eastern district, 4 in the Southern and 14 in the Western district.

Class I railroads for June had a net railway operating income of $50,312,580, which, for that month, was at the rate of 2.42 per cent. In June, 1935, their net was $34,102,703, or 1.63 per cent. Operating revenues for June amounted to $330,691,513, compared with $281,328,058 in June, 1935, an increase of 17.5 per cent. Operating expenses in June totaled $241,811,554, compared with $216,550,258 in the same

CLASS I RAILROADS—UNITED STATES

	1936	1935	Per Cent of Increase
Month of June			
Total operating revenues	$330,691,513	$281,328,058	17.5
Total operating expenses	241,811,554	216,550,258	11.7
Taxes	26,842,213	20,451,395	31.2
Net railway operating income	50,312,580	34,102,703	47.5
Operating ratio—per cent	73.12	76.97	...
Rate of return on property investment—per cent	2.42	1.63	...
Six Months Ended June 30			
Total operating revenues	$1,872,928,867	$1,635,535,933	14.5
Total operating expenses	1,421,381,428	1,259,945,852	12.8
Taxes	148,668,143	121,312,664	22.5
Net railway operating income	238,243,934	194,776,454	22.3
Operating ratio—per cent	75.89	77.04	...
Rate of return on property investment—per cent	2.22	1.81	...

month in 1935, or an increase of 11.7 per cent.

Class I railroads in the Eastern district for six months had a net of $161,543,115, at the rate of 2.94 per cent. For the same period in 1935, their net was $143,065,483, or 2.60 per cent. Operating revenues in the Eastern district for six months totaled $963,589,281, an increase of 12.7 per cent, compared with 1935 while operating expenses totaled $697,121,937, an increase of 12 per cent. Railroads in the Eastern district for June had a net railway operating income of $30,040,172, compared with $27,706,923 in June, 1935.

Class I railroads in the Southern district for six months had a net of $32,366,971, at the rate of 2.07 per cent. For the same period in 1935, their net amounted to $24,425,031, at the rate of 1.55 per cent. Operating revenues in the Southern district for six months amounted to $240,010,929, an increase of 12.9 per cent compared with the same period in 1935, while operating expenses totaled $182,712,154, an increase of 9.1 per cent. Railroads in the Southern district for June had a net of $4,683,953, compared with $3,532,295 in June, 1935.

Class I railroads in the Western district for six months had a net of $44,333,848, at the rate of 1.21 per cent. For the same six months in 1935, the railroads in the district had a net of $27,285,940, at the rate of .74 per cent. Operating revenues in the Western district for six months amounted to $669,328,657, an increase of 17.9 per cent above the same period in 1935, while operating expenses totaled $541,547,337, an increase of 15.2 per cent. For June, the railroads in the Western district reported a net of $15,588,455 compared with $2,863,485 for the same roads in June, 1935.

The Bureau of Statistics of the Interstate Commerce Commission has adopted a plan of issuing advance summaries of the railroad reports of their operating revenues, expenses, taxes, rents, and net railway operating income. The first such advance summary was issued on July 29 covering reports for June and six months of the year. A second more complete summary was issued on July 30 and a final summary, 100 per cent complete, was issued on August 3, the same day that the compilation of the Bureau of Railway Economics was released. The commission's complete statement of the revenues and expense reports for June will not be issued until later in the month.

I. C. C. to Investigate Hours of Service of Motor Carrier Employees

With a view to the establishment of reasonable requirements with respect to the maximum hours of service of employees of motor carriers in interstate or foreign commerce, as provided for in the motor carrier act, Division 5 of the Interstate Commerce Commission has ordered a proceeding of inquiry and investigation covering both common and contract carriers of passengers and freight which has been set for hearing at times and places yet to be announced. At the same time the commission ordered a similar proceeding for the purpose of determining whether, in the interest of, and to promote safety to, the general public, there is need for the prescription of qualifications and maximum hours of service and standards of equipment in connection with the operation of motor vehicles used in transporting property by private carriers.

Western Lines Extend Limit for Return Trips

After October 1 passengers on western lines paying the low round trip fares will have 30 days in which to make the return trip. Since the western lines reduced their rates in December, 1933, round trip fares have been 1.8 cents a mile in coaches, with a 10-day return limit.

McLaury to Direct A.A.R. Advertising

Herbert F. McLaury, advertising manager of the Chicago, Burlington & Quincy, has been selected to direct the advertising of the Association of American Railroads, with headquarters at Washington, D. C. Mr. McLaury's appointment became effective on August 1.

Me. C. Seeks Bus Authorization

The Interstate Commerce Commission has assigned the application of the Maine Central Transportation Company for a certificate authorizing operation as a common carrier in interstate commerce in Maine, New Hampshire, and Massachusetts for hearing on August 17 at Augusta, Maine, before Joint Board No. 69.

Additional Drought-Relief Rates

Secretary Wallace on August 5 announced that the Department of Agriculture Drought Committee had been notified by E. B. Boyd, chairman of the Western Traffic Executive Committee, that Western railroads have approved freight rate reductions on hay and forage shipped to drought counties in Colorado, Kansas, Minnesota, Missouri and Nebraska, in addition to rates already in effect to other states.

Hearings on Eastern Storedoor Tariffs Concluded

Hearings in connection with the Interstate Commerce Commission's investigation of pick-up and delivery service on Eastern railroads were concluded on August 5 with testimony from a number of railroad witnesses in rebuttal of previous testimony by representatives of trucking interests that operation of the service would be unprofitable to the railroads. It was stated that such testimony had overestimated the cost of performing the service and had ignored factors making for more economical handling of l.c.l. freight.

Pacific Railway Club

The Pacific Railway Club will hold its next regular meeting at the Palace Hotel, San Francisco, Calif., on Thursday evening, August 13. This meeting is for road foremen of engines and air brake supervisors and all interested in the subjects that they deal with. Charles A. Fogus, Southern Pacific, will talk about the streamliner "City of San Francisco"; Lee Pearson, Santa Fe, will speak on the streamliner "Super Chief"; Alfred C. Laydon, Westinghouse Air Brake Company, will speak on Braking High-Speed Trains and Frank L. Ryan, Southern Pacific, will speak on Train Handling.

New British Locomotives

Two new locomotives have recently been completed in the shops of the London & North Eastern of Great Britain. One, which has been named the "Green Arrow," is of the 2-6-2 type and has been designed for hauling fast passenger and freight trains; the other, called "Lord President," is of streamlined design and will be used for hauling fast passenger trains over the east coast route between Edinburgh and Aberdeen.

The "Green Arrow" is described as the first locomotive of its class to be built in Great Britain. It has three cylinders 18½ in. in diameter and with a 26 in. stroke, and a total weight in working order of 144 tons. An additional 32 locomotives of this type are to be constructed in L. N. E. shops.

The "Lord President," described as a modification of the "Earl Marischal," comprises with the latter and the "Cock o' the North" the "most powerful passenger locomotives in Great Britain." Its streamlining is similar to that of the "Silver Link" which hauls the L. N. E.'s "Silver Jubilee" train. It has three cylinders, each 21 in. by 26 in., and a total weight in working order of 167 tons. Three other locomotives of this type are under construction. All have been designed by Sir H. N. Gresley, chief mechanical engineer of the London & North Eastern.

Scheduled Air Lines Carry 97,453 Passengers in June

Scheduled air lines in the United States carried 97,453 passengers and 701,142 lb. of express, and flew 40,252,357 passenger-miles during June, 1936, the Bureau of Air Commerce has announced. The 21 domestic air lines—those operating within the borders of continental United States—also flew 344,433,493 express pound-miles. The total of miles flown was 5,619,896. In June, 1935, the 22 companies operating at that time carried 73,896 passengers, 330,970 lb. of express, and flew 31,225,699 passenger-miles, 186,310,017 express pound-miles, and a total of 4,993,328 miles. During June of this year 68 per cent of available seats were occupied, as against 60 per cent for June of the previous year. Complete figures for June, 1936, and June, 1935, and the first six months of 1936 and 1935, follow:

	June 1936	June 1935	First Half 1936	First Half 1935
Companies operating	21	22	.....	.....
Companies reporting	21	22	.....	.....
Passengers carried	97,453	73,896	421,587	319,484
Passenger-miles flown	40,252,357	31,225,699	179,509,746	139,436,311
Express carried (pounds)	701,142	330,970	2,911,775	1,412,969
Express pound-miles flown	344,433,493	186,310,017	1,542,874,591	868,769,804
Miles flown	5,619,896	4,993,328	29,078,403	24,642,134
Passenger seat-miles flown	59,094,819	52,254,552	302,541,881	249,921,288
Per cent—seats used	68	60	59	56

Emergency Rate Petition Denied

The Interstate Commerce Commission on August 3 announced its denial of the petition filed by the railroads on July 27 asking the commission to modify its outstanding orders so as to clear away certain procedural steps to enable the railroads to translate into permanent rates the emergency freight charges which will expire on December 31.

A committee representing the railroads is to meet at an early date to decide on their course of procedure in view of the denial of their petition. The commission's orders contain nothing to prevent the railroads from filing new tariffs covering the rates on which they desire to translate the emergency increases into permanent rates, subject to complaint and possible suspension.

Bureau of Motor Carriers Opens Additional District Offices

The Bureau of Motor Carriers of the Interstate Commerce Commission has announced the opening of additional District Offices in the field, as indicated below:

District No. 2—New York, N. Y. District Director R. K. Hagarty, in charge.

District No. 10—Kansas City, Mo. District Director James F. Miller, in charge.

District No. 12—Fort Worth, Texas. District Director Tilden F. Childs, in charge.

District No. 13—Denver, Colorado. District Director Daniel P. Harris, Jr., in charge.

District No. 15—Portland, Oregon. District Director Frank E. Landsburg, in charge.

District No. 16—San Francisco, Calif. District Director Richard T. Eddy, in charge.

The following additional district offices are to be opened on August 10:

District No. 1—Boston, Massachusetts. District Director Geo. R. Nuzum in charge.

District No. 4—Pittsburgh, Pennsylvania. District Director R. M. Snetzer in charge.

District No. 14—Salt Lake City, Utah. District Director B. L. Penn in charge.

R. F. C. Will Consider Loan Applications from Motor Carriers

Loan applications from established motor carriers operating on regular schedule will be considered under Section 5d of the Reconstruction Finance Corporation act, as amended, when all of the proceeds of such loans will be expended in part payment of the purchase price of new equipment, the corporation announced on August 5.

No loans will be considered for the purpose of enabling such applicants to further extend their service beyond existing routes. It will be required that such loans be so secured as reasonably to assure repayment and that the new equipment purchased be included in the collateral. Insurance against ordinary risks must be carried and the final maturity of such loans shall not be later than the expected life of the equipment to be purchased. All credit factors must be satisfactory and applicants will be required to submit evidence of compliance with all applicable statutes and regulations. Applications will not be considered from carriers engaged in intra-urban business.

Centenary Exhibit at Montreal

Adopting the role of a locomotive engineer, S. J. Hungerford, president of the Canadian National, last week in Montreal set in motion a working model of the "Dorchester," first Canadian locomotive, thus opening the Railway Exhibition in the Chateau de Ramezay (a Montreal historical museum) which will continue until September 1.

The ceremony was arranged by the Antiquarian and Numismatic Society of Canada in connection with the centenary celebrations of Canada's first railroad, the Champlain & St. Lawrence.

Dr. Victor Morin, president of the society, presided at the brief ceremony. Mr. Hungerford, in opening the exhibition, which consists of models, charts, documents, seals and various relics of the past century, pointed out that without the railroad the great industrial expansion of the past 100 years would have been impossible.

Other speakers included J. E. Labelle, C. N. R. trustee; J. M. R. Fairbairn, chief engineer for the Canadian Pacific Railway Co.; and L. O. Regnier, chairman of the French-Canadian section of the Railway Centenary Committee.

Railroads Still Show Net Deficit for Five Months

Class I railroads for the first five months of this year had a net deficit after fixed charges of $32,658,596, as compared with a net deficit of $56,194,880 for the corresponding period of last year, according to the Interstate Commerce Commission's monthly compilation of selected income and balance-sheet items. For the month of May there was a deficit of $2,419,574, as compared with a deficit of $4,667,992 in

SELECTED INCOME AND BALANCE-SHEET ITEMS OF CLASS I STEAM RAILWAYS

Compiled from 138 Reports (Form IBS) Representing 144 Steam Railways
TOTALS FOR THE UNITED STATES (ALL REGIONS)

For the month of May 1936	For the month of May 1935	*Income Items*	For the five months of 1936	For the five months of 1935
$41,842,148	$39,598,511	1. Net railway operating income	$187,931,356	$160,673,753
11,311,118	11,653,854	2. Other income	56,898,611	62,278,500
53,153,266	51,252,365	3. Total income	244,829,967	222,952,253
1,533,112	1,390,340	4. Miscellaneous deductions from income	7,831,872	7,287,014
51,620,154	49,862,025	5. Income available for fixed charges	236,998,095	215,665,239
		6. Fixed charges:		
11,406,319	11,303,366	6-01. Rent for leased roads	55,884,240	55,416,404
41,415,076	42,010,195	6-02. Interest deductions	207,647,413	210,337,672
218,502	216,625	6-03. Other deductions	1,093,179	1,089,184
53,039,897	53,530,186	6-04. Total fixed charges	264,624,832	266,843,260
* 1,419,743	* 3,668,161	7. Income after fixed charges	* 27,626,737	* 51,178,021
999,831	999,831	8. Contingent charges	5,031,859	5,016,859
* 2,419,574	* 4,667,992	9. Net income†	* 32,658,596	* 56,194,880
16,171,620	16,310,938	10. Depreciation (Way and structures, and Equipment)	80,694,433	81,227,662
2,295,116	1,273,546	11. Federal income taxes	8,790,671	6,636,863
		12. Dividend appropriations:		
11,705,152	13,677,751	12-01. On common stock	28,087,655	37,567,286
7,819,909	3,559,611	12-02. On preferred stock	12,729,411	7,845,482

Selected Asset Items	Balance at end of May 1936	Balance at end of May 1935
13. Investments in stocks, bonds, etc., other than those of affiliated companies (Total, Account 707)	$689,538,566	$763,962,004
14. Cash	$437,315,902	$352,684,887
15. Demand loans and deposits	3,774,699	10,851,936
16. Time drafts and deposits	30,787,294	38,516,633
17. Special deposits	87,745,060	63,327,800
18. Loans and bills receivable	3,378,911	4,901,185
19. Traffic and car-service balances receivable	59,467,891	54,025,740
20. Net balance receivable from agents and conductors	50,890,069	45,917,809
21. Miscellaneous accounts receivable	146,683,844	144,450,684
22. Materials and supplies	299,881,095	302,399,810
23. Interest and dividends receivable	28,695,324	41,575,309
24. Rents receivable	2,411,169	2,575,193
25. Other current assets	6,033,957	4,614,083
26. Total current assets (items 14 to 25)	$1,157,065,215	$1,065,841,069
Selected Liability Items		
27. Funded debt maturing within 6 months‡	$277,033,718	$217,005,139
28. Loans and bills payable§	$242,432,497	$320,570,268
29. Traffic and car-service balances payable	75,488,529	67,682,597
30. Audited accounts and wages payable	241,343,791	220,402,264
31. Miscellaneous accounts payable	87,312,416	62,290,863
32. Interest matured unpaid	458,113,818	339,452,497
33. Dividends matured unpaid	2,145,525	4,640,543
34. Funded debt matured unpaid	440,319,309	291,185,816
35. Unmatured dividends declared	19,798,911	15,897,423
36. Unmatured interest accrued	119,662,619	122,078,586
37. Unmatured rents accrued	41,264,762	40,142,909
38. Other current liabilities	21,167,100	18,185,245
39. Total current liabilities (items 28 to 38)	$1,749,049,277	$1,502,529,011
40. Tax liability (Account 771):		
40-01. U. S. Government taxes	$59,262,245	$37,088,535
40-02. Other than U. S. Government taxes	134,280,931	138,266,215

† The net income as reported includes charges of $1,454,945 for May, 1936, and $7,148,016 for the five months of 1936 on account of accruals for excise taxes levied under the Social Security Act of 1935; also $4,080,835 for May, 1936, and $12,068,063 for the five months of 1936 under the requirements of an Act approved August 29, 1935, levying an excise tax upon carriers and an income tax upon their employees, and for other purposes. (Public No. 400, 74th Congress). The net income for May, 1935, includes credits of $8,622,514, and for the five months of 1935 credits of $4,429,827, on account of reversal of charges previously made for liability under the Railroad Retirement Act of 1934.

‡ Includes payments which will become due on account of principal of long-term debt (other than that in Account 764, Funded debt matured unpaid) within six months after close of month of report.

§ Includes obligations which mature not more than 2 years after date of issue.

* Deficit or other reverse items.

NET INCOME OF LARGE STEAM RAILWAYS WITH ANNUAL OPERATING REVENUES ABOVE $25,000,000

Name of railway	Net income after depreciation		Net income before depreciation	
	For the five months of		For the five months of	
	1936	1935	1936	1935
Alton R. R.	* $749,468	*$1,020,945	* $608,279	* $888,404
Atchison, Topeka & Santa Fe Ry. System§	* 2,815,955	* 897,551	1,911,425	3,939,786
Atlantic Coast Line R. R.	828,308	195,623	1,719,460	1,135,764
Baltimore & Ohio R. R.	* 2,182,671	* 2,570,144	895,299	321,861
Boston & Maine R. R.	* 2,698,800	* 333,408	* 2,014,175	344,506
Central of Georgia Ry.†	* 1,103,023	* 1,201,205	* 782,108	* 865,207
Central R. R. of New Jersey	* 1,377,346	* 562,519	* 736,915	126,431
Chesapeake & Ohio Ry.	15,016,910	10,214,578	18,540,820	13,615,239
Chicago & Eastern Illinois Ry.‡	* 523,958	* 664,575	* 275,773	* 409,456
Chicago & North Western Ry.‡	* 8,164,812	* 5,403,384	* 6,083,677	* 3,293,681
Chicago, Burlington & Quincy R. R.	* 499,815	* 2,085,849	1,413,717	15,623
Chicago Great Western R. R.‡	* 695,688	* 820,062	* 489,706	* 602,414
Chicago, Milwaukee, St. Paul & Pacific R. R.‡	* 7,780,378	* 7,464,648	* 5,538,742	* 5,121,131
Chicago, Rock Island & Pacific Ry.‡	* 7,734,766	* 6,952,628	* 5,939,779	* 5,104,691
Chicago, St. Paul, Minneapolis & Omaha Ry.	* 1,474,424	* 1,234,979	* 1,225,109	* 971,621
Delaware & Hudson R. R.	* 768,939	* 953,863	* 305,954	* 543,697
Delaware, Lackawanna & Western R. R.	* 410,607	* 633,511	703,314	492,501
Denver & Rio Grande Western R. R.‡	* 2,179,592	* 1,983,045	* 1,697,371	* 1,486,747
Elgin, Joliet & Eastern Ry.	611,029	831,418	986,490	1,201,482
Erie R. R. (including Chicago & Erie R. R.).	* 28,171	* 743,906	1,595,432	959,862
Grand Trunk Western R. R.	761,665	* 149,261	1,249,262	301,057
Great Northern Ry.	* 3,512,112	* 3,910,054	* 1,971,845	* 2,403,388
Illinois Central R. R.	* 1,587,119	* 1,442,512	1,158,990	1,366,813
Lehigh Valley R. R.	* 279,190	* 444,054	680,091	533,274
Long Island R. R.	* 543,053	* 891,166	* 57,973	* 389,647
Louisville & Nashville R. R.	2,592,121	1,075,535	4,335,266	2,864,719
Minneapolis, St. Paul & Sault Ste. Marie Ry.	* 2,837,813	* 3,006,660	* 2,327,032	* 2,550,333
Missouri-Kansas-Texas Lines	* 1,274,722	* 2,282,275	* 739,358	* 1,737,293
Missouri Pacific R. R.‡	* 5,796,415	* 7,080,882	* 4,044,669	* 5,276,644
New York Central R. R.¶	* 684,862	* 3,423,198	6,057,194	3,509,990
New York, Chicago & St. Louis R. R.	970,017	1,521	1,614,643	679,252
New York, New Haven & Hartford R. R.‡	* 3,813,916	* 1,578,878	* 2,378,935	* 72,148
Norfolk & Western Ry.	12,021,689	7,755,018	13,894,136	9,631,343
Northern Pacific Ry.	* 4,615,072	* 5,370,406	* 3,311,252	* 4,043,980
Pennsylvania R. R.	8,958,813	7,761,272	17,950,125	16,665,528
Pere Marquette Ry.	1,102,205	383,187	2,158,073	1,456,272
Pittsburgh & Lake Erie R. R.	1,408,998	1,062,466	2,160,937	1,774,284
Reading Co.	2,429,263	1,854,063	3,760,184	3,098,779
St. Louis-San Francisco Ry.‡	* 3,853,856	* 5,167,752	* 2,507,564	* 3,849,072
St. Louis Southwestern Lines‡	* 148,489	* 196,769	104,524	64,658
Seaboard Air Line Ry.†	* 2,647,295	* 2,335,448	* 1,864,939	* 1,566,682
Southern Ry.	* 176,591	* 2,146,807	1,176,561	* 973,823
Southern Pacific Transportation System‖	* 2,126,786	* 3,433,305	1,159,084	* 289,601
Texas & Pacific Ry.	450,406	43,441	936,336	545,432
Union Pacific R. R.	1,010,137	2,343,647	3,659,180	5,044,645
Wabash Ry.†	* 1,004,879	* 996,691	* 114,349	* 93,866
Yazoo & Mississippi Valley R. R.	* 334,143	* 1,224,261	* 121,422	* 1,014,211

† Report of receiver or receivers.
‡ Report of trustee or trustees.
§ Includes Atchison, Topeka & Santa Fe Ry., Gulf, Colorado & Santa Fe Ry., and Panhandle & Santa Fe Ry.
¶ Includes Boston & Albany, lessor to New York Central R. R.
‖ Includes Southern Pacific Company and Texas & New Orleans R. R. The operation of all separately operated solely controlled affiliated companies, resulted in a net deficit of $1,690,121 for five months of 1936 and $1,675,628 for five months of 1935. These figures are not reflected in this statement.
* Deficit.

May, 1935. For the five months period 54 roads reported a net income and 81 roads reported a net deficit, while for the corresponding period of last year only 43 roads reported a net income and 92 reported deficits. For May, 59 roads reported a net income. The commission's compilations are shown in the accompanying tables.

Railroads and Water Lines Authorized to Substitute Highway Service

For a temporary period expiring December 31, 1936, the Interstate Commerce Commission has issued special permission orders authorizing the railroads and the carriers in the New York Inland Water Carriers Association to publish on short notice effective August 28 a tariff rule providing for the optional substitution of highway vehicle service for rail or water transportation of l.c.l. freight at the usual rates. This is in extension of a previous temporary arrangement which expires on August 28, and was vigorously opposed by the American Trucking Associations, Inc. The railroads, through W. S. Curlett, tariff-publishing agent, had asked on July 16 for authority to extend the tariff rule indefinitely, or at least for another year, but the commission limited its permission order, pending the decision of various legal questions which have been raised in other cases regarding service performed partly by rail and partly by highway. The railroad tariff rule provides that wherever as to less-than-carload freight an originating or delivering carrier substitutes, at its option, highway vehicle service for service by railroad between stations on its line, the rates and charges as published in the tariff will apply when the substitute service is performed either entirely by highway vehicle or partly by highway vehicle and partly by railroad; the highway vehicle service in all cases to be limited to the most practicable highway routing near to the line of the railroad making the substitution.

The Canadian Roads in June

The Canadian Pacific in June had net operating income totaling $1,175,549, as compared with $1,403,812 for June of last year, a decrease of $228,262. Gross revenues for June at $10,957,610 showed an increase of $767,738 over June of last year, while operating expenses at $9,782,060 revealed an increase of $996,001.

For the first six months of 1936, net revenues amounted to $6,790,999, as compared with $6,062,018 for the corresponding period of last year, an increase of $728,981. Gross for the six-month period at $62,044,346 showed an increase of $5,515,722, while operating expenses at $55,253,347 were $4,786,741 over the total for the corresponding six-month period of last year.

Operating revenues of the Canadian National all-inclusive system for June, 1936, totaled $14,739,765; operating expenses totaled $14,730,323, and net operating revenue $9,442. As compared with June, 1935, these results showed an improvement of $1,027,511 in operating revenues and $505,127 in net revenue.

For the first six months of this year operating revenues amounted to $85,461,428, an increase of $5,329,633 over the corresponding period of last year. Operating expenses during the half year amounted to $82,986,388, showing an increase of $5,022,130 over the half-yearly period of 1935. There was net revenue at the end of June, 1936, of $2,475,040, as compared with $2,167,537 in 1935, an increase of $307,503.

Live Fish by Carload, for Market

The Pennsylvania delivered at the Dock Street fish market in Philadelphia on August 5 a carload of live fish from Green Bay, Wis., the shipment consisting of 15,000 lb. of live carp. The fish were transported in a 70-ft. baggage car fitted up with nine tanks 10-ft. long by 3-ft. 4-in. wide, each holding 700 gallons of water.

The car has accommodations for an attendant and for a supply of ice sufficient to keep the water at an even temperature.

Reduced Suburban Fares on Reading

The Reading Company announces that, beginning September 1, round trip tickets good for one day, and family tickets for 20 rides, good for six months, are to be sold at stations in and near Philadelphia at from 10 to 20 per cent below present regular fares. For example: Rate between Reading Terminal, Philadelphia, and Jenkintown, 11 miles, 35 cents; (each family ticket costs 10 times the round trip rate); Lansdale, 24 miles, 75 cents; Doylestown, 34 miles, $1.00; Newtown, 26 miles, 80 cents; and Morristown, 17 miles, 50 cents. The one day round trip tickets, valid five days, Monday-Friday, are not to be good on trains in the rush hours, namely, those arriving at Philadelphia between 8:00 a.m. and 9:30 a.m. and those leaving between 4:30 p.m. and 6:30 p.m.

N. Y. Commission Report on Proposed Highway Carrier Safety Rules

The Public Service Commission of New York has approved a report of its chief engineer commenting on proposed safety regulations of the Interstate Commerce Commission applicable to motor carriers and has advised the federal commission that the state commission will insist that all buses, whether engaged in interstate or intrastate traffic, in the state of New York shall comply with the rules and regulations of the Public Service Commission.

The tentative rule of the federal commission most severely criticized by the state commission proposes to require that motor vehicles proceeding in convoy shall maintain, so far as possible, a distance of

at least 200 ft. between units of convoy. The state body requires that no trucks shall be closer together than 500 ft. on the highway. The report states that 200 ft. is too close and that if it is realized that a fleet of 4 or 5 large vehicles, each about 40 ft. in length, are proceeding on a heavily traveled highway, it will be appreciated that vehicles following such a caravan are in a hazardous position, for to fall in line with any number of trucks in a space not exceeding 200 ft., when they are traveling 45 m.p.h. (the speed limit proposed in the tentative federal regulations), is a dangerous operation.

The Interstate Commerce Commission rules would require that safety glass be installed in the windshield, rear window, doors and window next to the driver. The Public Service Commission requires safety glass in all openings where glass is used. The proposed rules of the Interstate Commerce Commission provide a minimum of two flares and two red flags to be carried by motor vehicles operating outside cities, towns or villages. The state commission believes that the requirement should be a minimum of three red flags and three flares.

Railways Fight Train-Limit Law in Louisiana

Pursuant to a complaint filed by nine railways operating in Louisiana, the United States district court has entered a restraining order, effective on July 28, prohibiting the enforcement of the Louisiana train-limit law, pending action on a motion for a temporary injunction. This statute, which was signed by the governor on June 20, limits freight trains to 70 cars exclusive of the caboose, and passenger trains to 16 cars, and provides further that an additional helper shall be provided in all switch crews that operate over public crossings. By a special proviso, all roads that have less than 100 miles of main tracks within the state are exempted from the provisions of the law, the roads thus exempted being the New Orleans Northeastern (Southern), the Louisville & Nashville, the St. Louis Southwestern, the New Orleans Terminal, the Texas Pacific-Missouri Pacific Terminal, the Louisiana Southern, the Louisiana Northwestern and the New Orleans Public Belt.

The nine railways that are contesting the law are the Texas & New Orleans (Southern Pacific), the Kansas City Southern, the Illinois Central, the Yazoo & Mississippi Valley, the Texas & Pacific, the Louisiana & Arkansas, the Missouri Pacific, the Gulf Coast Lines, and the Gulf, Mobile & Northern. The law is being attacked on the ground that the exemption of certain railroads makes it discriminatory, while the train-limit feature of the act is being contested on the grounds that it interferes with interstate commerce, that it is extra-territorial in its effect (since it would affect the operation of trains over engine districts extending beyond the state lines), and that the law does not affect safety of operation. The portion of the act relating to switch crews is being attacked on the ground that it is unnecessary.

Equipment and Supplies

Equipment Orders Forged Ahead During Last Month

Placements included 9 locomotives, 4,469 freight cars and 34 passenger-train cars

Domestic orders for 9 locomotives, 4,469 freight cars and 34 passenger train cars were reported in July issues of the *Railway Age*. Thus, this year's equipment business, having previously surpassed last year's 12-months volume, forged further ahead during the past month. Also, with orders are 104 steam locomotives and 27 of other types. As pointed out last month, the 1936 orders for steam locomotives are in excess of those for the entire 12 months of any year since 1930; and this year's total of orders for locomotives of all types—131—is about 58 per cent above last year's 12-months total of 83. Furthermore, among the past five years, it is exceeded only by orders placed in 1934 and 1931—183 and 176, respectively. On August 1, domestic inquiries for 11 steam locomotives were outstanding, while plans have been announced for the purchase of three others; also, there was an inquiry for three locomotives for export.

Thus far in 1936 orders for a total of 141 passenger-train cars have been reported, excluding articulated units for streamlined trains. This is more than twice the 63 passenger-train cars ordered during last year's entire 12 months and is

Domestic Equipment Orders Reported in Issues of The Railway Age in July, 1936

LOCOMOTIVES

Date	Name of Company	No.	Type	Builder
July 18	Union Pacific	1	Diesel-electric	Electro-Motive Corp.
July 25	Pittsburgh & West Virginia	2	2-6-6-4	Baldwin Locomotive Works
July 25	Richmond, Fredericksburg & Potomac	5	4-8-4	Baldwin Locomotive Works
Aug. 1	Union Pacific	1	Steam turbine electric	General Electric Co.

FREIGHT CARS

Date	Name of Company	No.	Type	Builder
July 4	Lehigh & New England	250	Hopper	Bethlehem Steel Co.
July 4	General Chemical Co.	3	Tank	American Car & Fdy.
July 4	Northern Pacific	500	Gondola	Pressed Steel Car Co.
		250	Flat	Company Shops
July 11	Cambria & Indiana	300	Hopper	American Car & Fdy.
July 11	St. Louis Southwestern	50	Automobile	Gen. American Trans. Corp.
July 11	Central of Georgia	200	Hopper	Pullman-Standard
July 11	Minneapolis, St. Paul & Sault Ste. Marie	500	Box	Pullman-Standard
July 11	Wisconsin Central	250	Box	Pullman-Standard
July 11	Western Maryland	25	Caboose	Company Shops
July 11	American Refrigerator Transit Co.	511	Refrigerator	American Car & Fdy.
		510		Gen. American Trans. Corp.
July 18	Aluminum Ore Co.	50	Covered Hopper	Pullman-Standard
July 18	Atchison, Topeka & S. F.	10	Covered Hopper	American Car & Fdy.
July 25	Minneapolis & St. Louis	60	Hopper	Gen. American Trans. Corp.
July 25	Norfolk & Western	800	Box	Ralston Steel Car Co.
		100	Auto-box	Magor Car Corp.
		100	Box	Greenville Steel Car Co.

PASSENGER-TRAIN CARS

Date	Name of Company	No.	Type	Builder
July 4	Southern Pacific	24	Chair, Parlor, Parlor-Observation, Dining, Tavern	Pullman-Standard
July 18	Seaboard Air Line	6	Coaches	Pullman-Standard
		4	Passenger-baggage	

July orders, the 1936 rail tonnage ordered passed 1935's 12-months total.

During the first seven months of this year orders have been placed for a total of 31,029 freight cars as compared with 18,699 ordered throughout last year. Also, since the compilation of these figures, there has been reported an additional order for 3,000 cars, as noted elsewhere in these columns. Furthermore, there were in July export orders for 110 freight cars, making a total of 516 ordered here for export this year; last year 110 cars were ordered here for export during the entire 12 months. There were outstanding on August 1 inquiries for 575 freight cars and plans have been announced for the acquisition of 1,000 others.

The nine locomotives ordered in July brought the year's total to date to 131, excluding power units for streamlined trains. Included in this year's locomotive larger than the total for any year since 1930, except 1934 when 388 passenger-train cars were ordered. On August 1, inquiries for 9 passenger-train cars were outstanding.

The July rail orders—44,500 tons—brought the year's seven months' total to 512,985 tons as compared with the 495,300 tons placed throughout 1935.

LOCOMOTIVES

The United Fruit Company is inquiring for 5 or 10, and possibly an additional 5, locomotives of the 2-8-2 type for service in Guatemala.

FREIGHT CARS

The Union Tank Car Company has ordered 3,000 tank cars of 6,500 gal. ca-

pacity from the American Car & Foundry Company.

IRON & STEEL

THE SEABOARD AIR LINE is inquiring for 6,280 tons of 100-lb. rail.

THE NEW YORK, CHICAGO & ST. LOUIS is inquiring for 5,000 tons of rails.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has ordered 3,000 tons of rails from the Carnegie-Illinois Steel Company, the Bethlehem Steel Company and the Inland Steel Company.

Construction

CALIFORNIA & OREGON COAST.—The city of Grants Pass, Ore., and the Crescent City, Calif., Harbor District have applied to the Interstate Commerce Commission for a certificate authorizing the construction of an extension of the California & Oregon Coast from Crescent City, Calif., to Waters Creek, Ore., 81.6 miles, proposing that the construction in Oregon be done by the city and that in California be done by the harbor district. It was stated that the W.P.A. administrations of Oregon and California had applied for a federal grant of $3,630,711 to defray the labor costs and that the applicants had applied to the Reconstruction Finance Corporation for a loan of $3,750,117 for equipment, materials, and supplies.

GEORGIA & FLORIDA.—Receivers of this property have been authorized by the Interstate Commerce Commission to build a line from Kingwood, Ga., to Moultrie, 1.7 miles; estimated cost, $44,706.

NEW YORK CENTRAL-ERIE.—The Public Service Commission of New York has denied a petition of the New York Central for a rehearing on its order directing the elimination of grade crossings of N. Y. C. and the Erie in the city of Dunkirk, N. Y. See *Railway Age* of June 27, page 1073.

NEW YORK CENTRAL.—The Public Service Commission of New York has approved the revised plans and estimate of cost in the amount of $44,500 for reconstruction work on the bridge carrying Midler avenue, Syracuse, N. Y., over the tracks of this road. This work is part of the general grade crossing elimination program in Syracuse. The order of the commission authorizes the N. Y. C. to do the work of supporting the tracks on struts at actual cost without contract—the amount which the railroad may spend in this connection being $3,500, in accordance with an estimate submitted by it for the work.

WABASH.—A contract has been awarded to the Ross and White Company, Chicago, for the design and construction of an automatic electric skip hoist type locomotive coaling and sanding plant of steel construction, having a capacity of 100 tons, to be built at Burlington Junction, Mo.

Supply Trade

The R and C Company, 1218 Olive street, St. Louis, Mo., has been appointed representative in that region of the **Blacker Engineering Corporation,** 123 Liberty street, New York City, for the sale of Blacker "B" power sledges.

C. R. Jernberg, formerly vice-president of the Standard Forgings Company, is now associated with the **Kropp Forge Company** of Chicago. Mr. Jernberg is directing Kropp sales in the territory contiguous to Chicago, having charge of contract and production sales.

Blake C. Howard has been placed in charge of all railroad business for **L. C. Chase & Company, Inc.,** selling division of **Goodall-Sanford Industries** in the St. Louis, Mo., area. Mr. Howard's headquarters will be in the Railway Exchange building, St. Louis.

Frank C. Miller has been appointed manager of sales of the tin plate division of the **Republic Steel Corporation,** Cleveland, Ohio, succeeding **George E. Totten,** resigned. Mr. Miller was formerly associated with the sales office at Detroit, Mich. **P. H. Hubbard** and **J. B. DeWolf** have been appointed assistant managers of the tin plate division.

The receivership of the **Erie Malleable Iron Company,** Erie, Pa., was terminated on July 24, by the United States District Court for the Western district of Pennsylvania. Reorganization was effected immediately with the following officers: **Enoch C. Filer,** president; **Charles G. Strickland,** vice-president; **J. H. Redhead,** executive vice-president and general manager; and **R. H. Eisenlord,** secretary and treasurer.

Paul C. Cady, who has been elected vice-president in charge of sales for the eastern district of the **Union Railway Equipment Company,** Chicago, with headquarters in New York, was educated

Bachrach
Paul C. Cady

at Baldwin University Law School and began his railway career in the mechanical department of the Lake Shore & Michigan Southern at Cleveland, Ohio. Later he was employed in the mechanical department of the New York Central at New York, and in 1919 resigned as assistant to the chief mechanical engineer of this road, to enter the railway supply business. Since that time he has been engaged in the railway supply business in New York, at the present time also being president of the Midland Supply Company.

OBITUARY

Robert S. Murray, former treasurer of the General Electric Company, died on July 29, at his home in Schenectady, N. Y. Mr. Murray, who had been in poor health for about a year, retired from his position for that reason on May 1.

Robert J. Sharpe, manager of sales of the General American Tank Car Corporation for the Tulsa district, died suddenly at Palmer Lake, Colo., on July 27. Mr. Sharpe had been connected with this company for 25 years.

John W. Kincade, who invented one of the first automatic locomotive stokers, died at his home in Cincinnati on July 31, at the age of 68. While working as a locomotive engineer on the Chesapeake & Ohio he devised a stoker, which was at first worked by hand, but later by steam. Several were used on this road with the long firebox locomotives, but were discontinued when the wider firebox design was introduced. The stoker was improved and became known as the Day-Kincade, and later on as the Victor, but never got beyond experimental use.

Robert A. Becker, of the Fargo Manufacturing Company, Poughkeepsie, N. Y., died suddenly on August 1, at the age of 71, having been seized with an attack of the heart while out walking. Mr. Becker was long connected with the Hall Signal Company and was one of the earliest members of the Railway Signaling Club (1897). He had charge of signal construction work on the Lehigh Valley, the New York Central, the Illinois Central and a number of other roads. Later he was assistant superintendent of construction for the General Railway Signaling Company. He was the founder of the Fargo Manufacturing Company, which carried on an extensive business in signal accessories.

TRADE PUBLICATION

MODERN PAYROLL METHODS.—A descriptive folder (Form 7067) showing payroll accounting plans for all types and all sizes of businesses has been published by Burroughs Adding Machine Company. The folder is well illustrated with representative forms for compiling information required by Social Security laws. One set of forms illustrates how to write check (or envelope), employee's statement, earnings record and payroll sheet—all in one operation. Machines ranging from an inexpensive desk bookkeeping machine to an automatic accounting machine are also pictured. Copies are available without charge or obligation from the Advertising Department, Burroughs Adding Machine Company, Detroit, Mich.

Financial

ATCHISON, TOPEKA & SANTA FE.—*Acquisition.*—The Southern Kansas Stage Lines, Inc., has applied to the Interstate Commerce Commission for authority to acquire by purchase the properties of three truck lines in Oklahoma, the Harris Truck Line, the Hewitt Truck Line, and the Burton Truck Line.

CENTRAL OF GEORGIA.—*Equipment Trust.*—The receiver has applied to the Interstate Commerce Commission for authority for an issue of $400,000 of equipment trust certificates at 4 per cent in connection with the acquisition of 200 50-ton hopper bottom coal cars.

CHESAPEAKE & OHIO.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $29,500,000 of refunding and improvement mortgage 3½ per cent series E bonds, maturing 1996. The proceeds of the issue are to be used to retire 4½ and 5 per cent bonds, and thus save interest charges. The issue is authorized for sale to Morgan, Stanley & Co. at 97.5, which will make the average annual cost of the money to the railway 3.59 per cent.

CHICAGO & ILLINOIS MIDLAND.—*Bonds.*—Halsey, Stuart & Co. and five associated companies have, subject to the approval of the Interstate Commerce Commission and the Illinois Commerce Commission, offered at 99½ an issue of $5,500,000 of first mortgage sinking fund 4½ per cent series A bonds of this company due 1956. The Interstate Commerce Commission has authorized this issue of bonds by the railroad, to be sold to the underwriters at 96.75, making the interest cost 4.75 per cent. The commission has also authorized the road to issue $1,500,000 of 6 per cent income debentures and 24,000 shares of $100-par capital stock, these latter securities to be delivered to the proprietor company in payment of advances.

CHICAGO UNION STATION.—*Bonds.*—Kuhn, Loeb & Co. and five associated companies have offered, subject to approval of the Interstate Commerce Commission, $7,000,000 of 3½ per cent bonds guaranteed by the proprietary companies, due 1951. The offering price is 102.

ERIE.—*Control of West Clarion.*—The Interstate Commerce Commission has authorized this company to acquire control of the West Clarion (merger of the Brockport & Shawmut with which has recently been authorized) by purchase of its capital stock.

MINNEAPOLIS & ST. LOUIS.—*Dismemberment Hearings.*—Rebuttal testimony by members of Associated Railways, Inc., was concluded at the hearings being held by the Interstate Commerce Commission at Minneapolis, Minn., on July 30. Some testimony presented supported claims that rates and routes as advantageous as those now furnished by the M. & St. L. to stations on its lines will be available after the transfer to new owners, while other testimony was designed to show that the Minneapolis & St. Louis has been under-maintained. Those who testified that the rates and routes will continue satisfactory to the communities included E. W. Soergel, assistant freight traffic manager of the Chicago, Milwaukee, St. Paul & Pacific; George A. Hoffelder, assistant freight traffic manager of the Chicago, Burlington & Quincy; and M. V. Gunderson, commerce assistant of the Chicago & North Western. Mr. Soergel said that points west of Minneapolis on the M. & St. L. in Minnesota and South Dakota will have the same milling or other processing-in-transit privileges and the same local and proportional rates on shipments of grain and other products to Minneapolis and other markets. Also the M. & St. L. territory will have the same arrangements as now on freight moving to all large consuming centers. The commerce moving between Minneapolis and northwestern Iowa over the M. & St. L. can and will be handled by the Milwaukee and other lines, he said. Similar testimony, as to adequate service to be furnished by the Burlington in the territory east of Oskaloosa, Iowa, and by the Omaha-North Western in southwestern Minnesota and northwestern Iowa was submitted by Messrs. Hoffelder and Gunderson.

Among the witnesses testifying to show that portions of the M. & St. L. are in poor condition because of track maintenance was F. T. Beckett, assistant chief engineer of the Chicago, Rock Island & Pacific, who said that $135,093 or $1,195 a mile would have to be spent within the next year to put in good condition the four pieces of Iowa trackage that the Rock Island would take over and operate. Several bridges need repairs or replacement, worn out ties should be replaced, battered rails removed and new ballast applied.

G. M. O'Rourke, district engineer of the Illinois Central lines north of the Ohio, testified that $82,050 would be required to put the Minneapolis terminal properties in good shape. Approximately $730,000 would have to be spent over a five-year period to bring the Hopkins-Albert Lea track to a condition necessary for speedy operation of trains, according to B. R. Kulp, engineer maintenance of the Chicago & North Western.

H. R. Clarke, engineer maintenance of way of the Chicago, Burlington & Quincy, using photographs to support his statements, contended that the line between Peoria, Ill., and Oskaloosa, Iowa, was in poor condition because of under-maintenance.

A. D. Emery, assistant engineer of the Milwaukee, testified as to the necessity of considerable maintenance on the line from Norwood to Hanley Falls. Hubert Wuerth, division engineer of the Milwaukee, contended that, while the rail is mostly in fair condition on the Albia-Marshalltown line and at the Oskaloosa terminal, many of the ties are in poor condition and should be replaced. About 12,000 ties are needed at the Oskaloosa terminal alone, Mr. Wuerth said.

Statements that the M. & St. L. has been under-maintained were challenged by officers of the road. John W. Devins, general manager of the line, explained that the improvement budget for 1936 calls for the installation of a total of 315,000 new ties, or an average of 219 ties per mile for the 1,437 miles of line now comprising the system. This program, he said, is more extensive than that for the pre-depression year of 1929, when 269,435 ties, or 177 per mile, were installed. The improved program for this year, he pointed out, also included the laying of 4,325 tons of new 90-lb. rail and 500 tons of 100-lb. rail, and the reballasting with new cinders of 35 miles of heavy-duty track.

MARIANNA & BLOUNTSTOWN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon a branch extending from Blountstown, Fla., to Scotts Ferry, 14 miles.

NEW YORK, CHICAGO & ST. LOUIS.—*Notes.*—This company has applied to the Interstate Commerce Commission for authority to issue and sell $16,000,000 of 10-year 4 per cent collateral trust notes, for the purpose of paying loans from the Reconstruction Finance Corporation and the Railroad Credit Corporation and for other corporate purposes.

PENNSYLVANIA.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon a 1.4-mile segment of its Rainey branch (Fayette county, Pa.).

PENNSYLVANIA.—*Bonds.*—Kuhn, Loeb & Co. has offered, subject to approval of the Interstate Commerce Commission, $20,000,000 of general mortgage 3¾ per cent Series C bonds of this company, due 1970, priced at 101½ to yield 3.67 per cent.

SOUTHERN.—*Abandonment.*—At the request of the applicant the Interstate Commerce Commission has dismissed the application of the Tennessee Valley Authority for a certificate permitting the Southern to abandon its Lafollette branch, in Campbell county, Tenn., in a territory to be flooded. The application was opposed by the Southern.

SOUTHERN PACIFIC.—*Abandonment.*—This company and the Central Pacific have applied to the Interstate Commerce Commission for authority to abandon part of a branch line between Tonopah Junction, Nev., and Benton, Calif., 50 miles.

WHEELING & LAKE ERIE.—*Stock.*—The Interstate Commerce Commission has granted this company's petition to reduce to 102,140 the number of shares of its common stock which it may issue in conversion of a like amount of its 5½ per cent cumulative preferred stock.

Average Prices of Stocks and of Bonds

	Aug. 4	Last week	Last year
Average price of 20 representative railway stocks..	54.11	54.74	35.54
Average price of 20 representative railway bonds..	81.13	80.95	74.36

Dividends Declared

Allegheny & Western.—Guaranteed, $3.00, semi-annually, payable January 2 to holders of record December 19.

Boston & Albany.—$2.00, payable September 30 to holders of record August 31.

Dayton & Michigan.—87½c, semi-annually, payable October 1 to holders of record September 15; 8 Per Cent Preferred, $1.00, quarterly, payable October 7 to holders of record September 15.

East Mahoning.—$1.25, semi-annually, payable December 15 to holders of record December 5.

Railway Officers

EXECUTIVE

J. R. Hayden, who has been appointed assistant to the president of the Atchison, Topeka & Santa Fe, with headquarters at San Francisco, Cal., as announced in the *Railway Age* of August 1, was born in Jennings County, Ind., on March 13, 1872. Mr. Hayden first entered railway service with the St. Louis-San Francisco as a student telegrapher, later serving in the same capacity with other western railroads. In 1894 he became a telegrapher on the Kansas City, Fort Smith & Memphis (now part of the Frisco), later holding the positions of operator-agent and dispatcher. In 1900 Mr. Hayden went with the Santa Fe as a relief telegrapher at Las Vegas, N. M. For the next several years he held the positions of agent-telegrapher and agent at various points, being

J. R. Hayden

sent to Los Angeles, Cal., in 1905 as traveling freight agent. After two years in the latter capacity he was appointed industrial agent and subsequently became assistant industrial commissioner for the system. In May, 1922, he was appointed assistant traffic manager at San Francisco, the position he was holding at the time of his recent appointment as assistant to the president with the same headquarters.

Thomas B. Gallaher, whose appointment as assistant to the vice-president in charge of traffic of the Atchison, Topeka & Santa Fe, with headquarters at Chicago was reported in the *Railway Age* of August 1, has been connected with the Santa Fe continuously for 30 years. He was born on December 2, 1885, at Graham, Tex., and obtained his higher education at Texas Christian University, graduating in 1906, and later attended law school for two years. While attending school, Mr. Gallaher, during his summer vacations, served the Santa Fe as cashier in the freight depot at Weatherford, Tex. His experience during this period also included a summer's work with the Texas & Pacific as a train, baggage and express messenger. In September, 1906, after finishing school, Mr. Gallaher entered the service of the Santa Fe as a clerk of ticket

Thomas B. Gallaher

agents accounts in the accounting department at Amarillo, Tex. Subsequently he served successively as head clerk of freight station accounts, head clerk, rate desk clerk and traveling auditor. On December 1, 1907, he entered the traffic department as traveling freight and passenger agent and rate clerk. On April 1, 1917, he was advanced to division freight and passenger agent and during federal control of the railroads he served as assistant general freight and passenger agent. On July 15, 1920, he was appointed general freight and passenger agent at Amarillo, which position he was holding at the time of his recent appointment as assistant to the vice-president in charge of traffic.

FINANCIAL, LEGAL AND ACCOUNTING

A. B. Twyman, assistant general auditor of the Wabash, with headquarters at St. Louis, Mo., has been appointed acting general auditor, relieving **G. E. Bramon,** who has been granted a leave of absence because of ill health.

O. G. Edwards, assistant general attorney of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Seattle, Wash., has been appointed tax commissioner with headquarters, for the time being, at Milwaukee, Wis., to succeed **A. S. Dudley,** who has retired, effective August 1, after 38 years' service with this company.

Charles A. Magaw, general solicitor for the Union Pacific at Omaha, Neb., whose retirement was noted in the *Railway Age* of August 1, has served in various capacities in the legal department of the Union Pacific for 25 years. He was born on August 15, 1872, at Fairhaven, Ohio, and was educated at Washburn college, Topeka, Kan., and at the University of Kansas at Lawrence, graduating with a law degree from the latter university in 1897. He began the practice of law in the same year at Topeka, where he later became a member of the firm of Ferry, Doran & Magaw. On August 15, 1911, Mr. Magaw entered the service of the Union Pacific at Topeka, as an assistant attorney, being appointed assistant general attorney, with the same headquarters on August 1, 1913. Four years later he was transferred to Omaha, where he was advanced to general attorney on August 1, 1918. On January 1, 1933, he was appointed general solicitor, with jurisdiction in Nebraska, Kansas, Iowa, Missouri, Colorado and Wyoming, holding this position until his retirement.

OPERATING

A. G. Stuckey, chief dispatcher on the Southern division of the Kansas City Southern, with headquarters at Shreveport, La., has been promoted to trainmaster, with the same headquarters.

E. A. Whitman, acting general manager of the Minneapolis, St. Paul & Sault Ste. Marie, has been appointed general manager, with headquarters as before at Minneapolis, Minn., thereby succeeding to a portion of the duties of the late **A. E. Wallace,** formerly vice-president and general manager of the Soo line. Mr. Whitman is also vice-president of the Duluth, South Shore & Atlantic.

R. A. Messmore, superintendent of the Montpelier division of the Wabash, with headquarters at Montpelier, Ohio, has been promoted to assistant general manager, with headquarters at St. Louis, Mo., succeeding **Thomas M. Hayes,** whose appointment as assistant passenger traffic manager is noted elsewhere in these columns. **H. G. Pace,** trainmaster at Springfield, Ill., has been appointed superintendent, St. Louis Terminal division, Wabash Fruit Terminal, at St. Louis, Mo., to succeed **C. A. Johnston,** who has been transferred to the Montpelier division to replace Mr. Messmore.

Walter O. Frame, who has been appointed assistant superintendent on the Chicago, Burlington & Quincy at Wymore, Neb., as reported in the *Railway Age* of July 11, was born on October 27, 1890, at Osceola, Iowa. Mr. Frame first entered railway service in 1905 in the track de-

Walter O. Frame

partment of the Burlington at Osceola, serving successively as a section foreman, extra gang foreman, and as foreman in charge of construction until 1911, when he

was made construction roadmaster on grade reduction work for the Kansas City Terminal. Two years later he went with the Chicago, Rock Island & Pacific as an extra gang foreman, returning to the Burlington in 1914 as an extra gang foreman on the St. Joseph division. In 1916 Mr. Frame was advanced to roadmaster on the Hannibal division, and from 1918 to 1921 he served as roadmaster and assistant trainmaster on the Aurora division. At the end of this period he was made inspector of maintenance of way on the staff of the general manager of the Lines East of the Missouri river, then being assigned to the Beardstown division, where he served as trainmaster and roadmaster until 1927. In March of that year he was appointed engineer maintenance of way of the Illinois district, being transferred to the Iowa district in August, 1927, and to the Central district in October, 1931. He was located on the latter district at the time of his recent appointment as assistant superintendent at Wymore.

TRAFFIC

Gray E. Loury has been appointed division freight agent of the Huntington division of the Chesapeake & Ohio, with headquarters at Huntington, W. Va., succeeding **S. J. McBride,** deceased.

Effective August 1 the following changes have been made in the traffic department of the Seaboard Air Line: **W. A. Marshall,** general freight agent, with headquarters at Norfolk, Va., has been appointed assistant to chief freight traffic officer, with the same headquarters. **C. L. Senter,** assistant general freight agent at Norfolk, has been appointed general freight agent at that point to succeed Mr. Marshall. **R. T. Etheridge** has been appointed assistant freight traffic manager in charge of rates and divisions at Norfolk to succeed **R. H. Eberly,** whose appointment as freight traffic manager was announced in the *Railway Age* of July 25. **L. P. King,** assistant general freight agent, with headquarters at Charlotte, N. C., has been appointed assistant freight traffic manager, in charge of commission cases, with headquarters at Norfolk, succeeding Mr. Etheridge. Mr. King will in turn be replaced by **W. P. Hickey. F. H. Bryant,** assistant freight traffic manager, with headquarters at Jacksonville, Fla., has been transferred in the same capacity to Norfolk, Va. He will be succeeded by **J. P. Derham, Jr. W. M. Andrews,** assistant to freight traffic manager, and **J. C. Warren** have been appointed assistant general freight agents at Norfolk. The position formerly held by Mr. Andrews has been abolished. **B. J. King** has been appointed district freight agent with headquarters at Greenville, S. C., and **O. O. Walters** has been appointed district freight agent with headquarters at Jacksonville, Fla.

W. D. Corfield, whose appointment as assistant freight traffic manager of the Reading was noted in the *Railway Age* of July 25, entered the service of the Reading in 1884 as a waybill clerk. Two years later he became clerk and subsequently was made assistant shipping clerk, rate clerk, chief clerk and freight solicitor. In

W. D. Corfield

1897 Mr. Corfield was appointed agent of the Blue Ridge Dispatch. In 1912 he became division freight agent and in 1927 was appointed general freight agent, the position he held until his recent appointment as assistant freight traffic manager, with headquarters at Philadelphia, Pa.

Thomas M. Hayes, assistant general manager of the Wabash, has been appointed assistant passenger traffic manager, with headquarters as before at St. Louis, Mo. Mr. Hayes was born at Morrisonville, Ill., and, after a public school and business college education, entered railway service in 1903 as a trackman on the Wabash. Two years later he became a clerk to a track supervisor, later being assigned to the position of stenographer in the division engineer's office. In 1909 Mr. Hayes was advanced to traveling secretary to the president, serving in this position until 1924, when he was made assistant to the presi-

Thomas M. Hayes

dent. In 1931, when the Wabash was placed in receivership, Mr. Hayes' title was changed to assistant to the receiver. Two years later he was appointed assistant general manager, which position he held until his recent promotion to assistant passenger traffic manager, which was effective on August 1.

George L. Helmstadter, general agent for the Chicago & North Western at Cincinnati, Ohio, has been appointed general passenger agent, with headquarters at Chicago, to succeed **Morris R. Leahy,** who has retired, effective August 1, after 51 years' service with this company. Mr. Helmstadter was born on October 16, 1896, and entered the service of the North Western on September 1, 1920, as chief clerk in the traffic department at New York. Prior to going with the North Western Mr. Helmstadter had served for a short time with the Pennsylvania. On October 1, 1922, he was made city agent at New York for the North Western, and on March 1, 1929, he was advanced to trave'ing agent. On July 1 of the same year Mr. Helmstadter was further promoted to general agent at Cin-

George L. Helmstadter

cinnati, the position he was holding at the time of his recent appointment as general passenger agent at Chicago.

ENGINEERING AND SIGNALING

William C. Johnson, general signal supervisor of the Chicago, St. Paul, Minneapolis & Omaha, has been promoted to superintendent telegraph and signals, effective July 27, with headquarters as before at St. Paul, Minn., succeeding **George Boyce,** deceased.

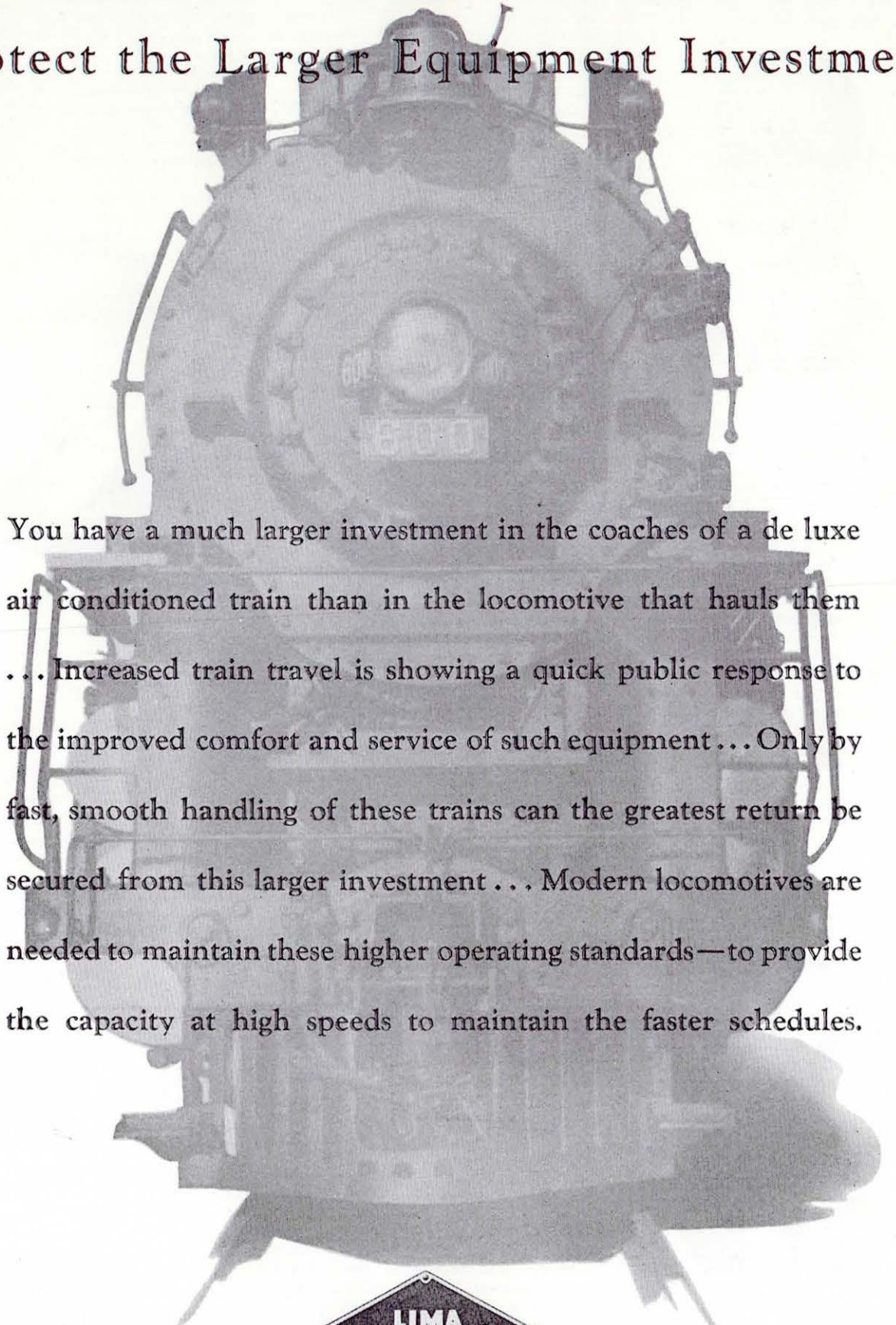
T. Z. Krumm, principal assistant engineer of the Minneapolis, St. Paul & Sault Ste. Marie, effective August 1, was appointed chief engineer of this company and of the Duluth, South Shore & Atlantic, with headquarters as before at Minneapolis, Minn. On both roads Mr. Krumm succeeds **E. A. Whitman,** promoted.

Walter E. Heimerdinger, who has been appointed district maintenance engineer of the Second district of the Chicago, Rock Island & Pacific, has been connected with the Rock Island for about 25 years. He was born on February 12, 1889, at Vulcan, Mich., and received his higher education at the University of Michigan, Ann Arbor. He entered the service of the Rock Island in September, 1911, and served successively at various points as an assistant on the engineering corps, inspector, instrumentman, roadmaster, assistant engineer, and office engineer. In 1922 he served as resident engineer on the con-

Continued on next left-hand page

MODERN LOCOMOTIVES

Protect the Larger Equipment Investment



You have a much larger investment in the coaches of a de luxe air conditioned train than in the locomotive that hauls them . . . Increased train travel is showing a quick public response to the improved comfort and service of such equipment . . . Only by fast, smooth handling of these trains can the greatest return be secured from this larger investment . . . Modern locomotives are needed to maintain these higher operating standards—to provide the capacity at high speeds to maintain the faster schedules.

LIMA LOCOMOTIVE WORKS LIMA LOCOMOTIVE WORKS INCORPORATED INCORPORATED, LIMA, OHIO

struction of the Rock Island terminals in Omaha, Neb., and in 1924 and 1925 he was the locating engineer in charge of surveying the line from Trenton, Mo., to Kansas City. Appointed division engineer on

Walter E. Heimerdinger

March 1, 1923, Mr. Heimerdinger has held that position at Des Moines, Iowa; Trenton, Mo., and Cedar Rapids, Iowa, being located at the latter point at the time of his recent appointment as district maintenance engineer of the Second district, with headquarters at Kansas City, Mo.

William H. Hillis, who has been appointed engineer maintenance of way of the Chicago, Rock Island & Pacific, with headquarters at Chicago, as announced in the *Railway Age* of July 11, was born at Colona, Ill., on March 31, 1886. At the time of his recent appointment Mr. Hillis had been in the service of the Chicago, Burlington & Quincy for more than 30 years. He first entered the service of that company as a rodman at Beardstown, Ill., on January 1, 1906, serving in various capacities in the engineering department until August 15, 1911, when he was appointed roadmaster. During the following five years he served in the latter position on various divisions, then being transferred to the operating department as trainmaster

William H. Hillis

on the Aurora division. In 1925 Mr. Hillis was appointed district engineer of maintenance of the Illinois district with headquarters at Galesburg, Ill., and in October, 1927, he was advanced to assistant superintendent of the La Crosse division. Three years later he was transferred to the Galesburg division, and on December 15, 1931, he was sent to Texas where, as superintendent of construction, he had charge of the construction of a 110-mile line between Childress, Tex., and Pampa. Following the completion of this work Mr. Hillis returned to the La Crosse division as assistant superintendent, which position he was holding at the time of his recent appointment as engineer maintenance of way of the Rock Island.

John L. Starkie, who has been appointed district engineer of the Eastern district of the Eastern lines of the Atchison, Topeka & Santa Fe, as reported in the *Railway Age* of July 11, has been connected with the Santa Fe and affiliated lines for more than 30 years. He was born on October 27, 1883, at Worcester, Mass., and graduated from the University of Kansas in 1905. Immediately thereafter, Mr. Starkie entered railway service with the Kansas City, Mexico & Orient (now part of the Atchison, Topeka & Santa Fe), where he served as a chainman, rodman and instrumentman on the construction of new lines in Kansas, Oklahoma, Texas and Mexico. In May, 1909, Mr. Starkie was promoted to resident engineer, in which capacity he divided his time between maintenance and construction work. In December, 1913, he left the Orient to become a draftsman on the Gulf, Colorado & Santa Fe at Galveston, where he was advanced to office engineer in April, 1914. During federal control of the railroads, Mr. Starkie served as office engineer until August, 1918, when he was appointed assistant chief engineer of Group VI of the Southwestern region, with headquarters at Dallas, Tex., returning to the position of office engineer on the G. C. & S. F. at Galveston in October, 1919. In July, 1924, he was appointed manager and operator of the railroad's ballast plant at Brownwood, Tex., which position he retained until 1930, when he was appointed division engineer at Temple, Tex. In 1931 Mr. Starkie returned to the position of office engineer at Galveston, where he remained until his recent appointment as district engineer at Topeka.

John L. Starkie

MECHANICAL

P. C. Withrow, mechanical engineer of the Denver & Rio Grande Western, has been appointed acting general mechanical superintendent, with headquarters as before at Denver, Colo., succeeding **W. J. O'Neill,** whose appointment as superintendent motive power of the Western Pacific was reported in the *Railway Age* of June 20.

Laurence C. Bowes, general piece work supervisor of the Chicago, Rock Island & Pacific, has been promoted to the

Laurence C. Bowes

newly created position of engineer of shop plants and machinery, with headquarters as before at Chicago. Mr. Bowes was born on June 23, 1890, at Minneapolis, Minn., and received his higher education at Cornell university. He entered the service of the Rock Island in July, 1916, as inspector of stationary boiler plants, serving in this capacity until December, 1922, except for a period during the World War when he was in military service, serving as a private and sergeant overseas. At the end of this period he was promoted to production engineer, and on July 1, 1926, he was advanced to general piece work supervisor, the position he was holding at the time of his recent appointment.

SPECIAL

R. W. Jennings, assistant advertising manager of the Chicago, Burlington & Quincy, with headquarters at Chicago, has been promoted to advertising manager to succeed **Herbert F. McLaury,** who has been placed in charge of advertising for the Association of American Railroads.

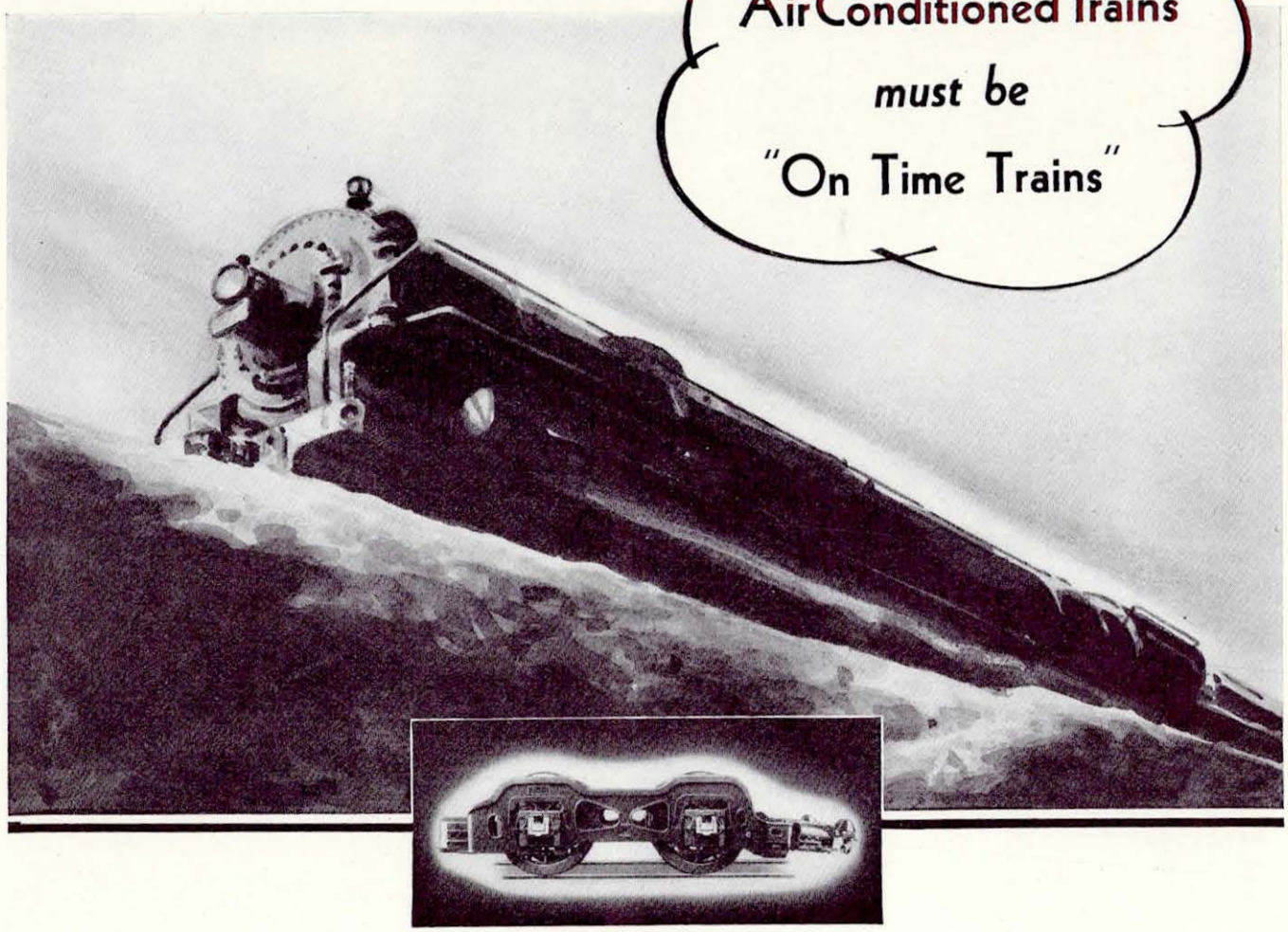
OBITUARY

Horace J. Clark, retired district superintendent of the Pullman Company in Houston, New Orleans and Detroit, died at Springfield, Mass., on August 2, a month after his retirement.

Charles R. Capps, who retired as chief traffic officer of the Seaboard Air Line on July 16 because of ill health, died at his home in Norfolk, Va., on July 31. Mr. Capps was 65 years of age.

Tables of Revenues and Expenses of Railways begin on next left-hand page

"Air Conditioned Trains"
must be
"On Time Trains"



Or the Investment is Impaired

Air conditioning increases the power demand on the locomotive. It is equivalent to adding one or more cars to the train.

To maintain operating standards, extra power is needed for starting, for accelerating and to get out of "tight places."

The Locomotive Booster provides this added power instantly when needed—power that insures smooth operation, avoids loss of time in starting and safeguards schedules.

Its application means economical operation and more satisfied passengers in your de luxe equipment.

Without The Booster, air conditioned and other trains are under an operating handicap.

The close tolerances essential to efficient Booster operation call for genuine repair parts made by Franklin.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

Revenues and Expenses of Railways

MONTH OF JUNE AND SIX MONTHS OF CALENDAR YEAR 1936

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: After depr. & retir. 1936	After depr. & retir. 1935	Before depr. & ret.
Akron, Canton & Youngstown	June	171	$172,396	$19	$179,845	$32,490	$16,340	$9,073	$52,334	$119,574	66.5	$60,271	$47,504	$27,447	$14,151	$31,951
	6 mos.	171	1,033,571	247	1,102,159	171,146	99,682	50,160	314,844	691,257	62.7	410,902	339,604	226,273	189,148	253,164
Alton	June	956	993,203	169,288	1,326,965	267,531	200,906	51,177	496,332	1,068,938	80.6	258,027	166,707	—15,569	—227,735	13,549
	6 mos.	956	5,522,100	986,232	7,525,247	1,041,808	1,317,297	279,251	3,026,856	6,029,099	80.1	1,496,148	975,959	—40,123	—526,157	130,184
Atchison, Topeka & Santa Fe System	June	13,227	10,793,000	1,431,393	13,297,005	2,144,489	2,986,943	463,126	4,468,418	10,497,840	78.9	2,799,165	1,687,976	1,787,359	999,951	2,734,350
	6 mos.	13,233	56,110,483	7,185,740	69,496,823	11,204,514	17,253,496	2,541,038	25,903,695	59,539,597	85.7	9,957,226	3,558,817	3,734,890	4,728,250	9,409,261
Atlanta & West Point	June	93	96,982	22,782	139,206	18,313	30,666	7,895	58,987	124,777	89.6	14,429	7,573	—7,074	—19,645	889
	6 mos.	93	573,517	129,871	835,821	109,202	168,411	48,436	354,356	737,483	88.2	98,338	56,230	—26,514	—59,853	28,607
Western of Alabama	June	133	85,815	22,676	122,718	17,415	31,913	6,600	48,263	111,858	91.2	10,860	2,239	4,043	—18,569	13,428
	6 mos.	133	520,325	132,452	741,873	120,930	184,471	41,905	303,926	700,246	94.4	41,627	—10,282	2,159	—62,439	80,770
Atlanta, Birmingham & Coast	June	639	192,523	8,381	228,407	45,584	50,196	20,691	100,282	238,846	104.6	—10,439	—23,843	—33,131	—23,980	—21,676
	6 mos.	639	1,285,992	124,261	1,599,154	257,666	299,498	131,151	643,165	1,479,989	92.5	119,165	36,921	—57,381	—108,653	14,292
Atlantic Coast Line	June	5,144	2,485,207	342,112	3,155,544	380,222	691,602	122,799	1,298,918	2,628,915	83.3	526,629	201,629	51,309	18,053	226,834
	6 mos.	5,145	16,360,208	4,206,712	23,313,558	2,457,808	4,142,779	780,759	8,958,295	17,450,145	74.8	5,863,413	3,013,413	2,170,622	1,696,127	3,237,299
Charleston & Western Carolina	June	342	165,845	1,150	170,884	26,162	29,149	6,494	56,224	123,716	72.4	47,168	28,168	23,831	15,869	30,053
	6 mos.	342	1,056,632	6,909	1,092,464	156,244	168,830	38,283	361,405	754,574	69.1	337,890	229,890	211,195	191,460	248,915
Baltimore & Ohio	June	6,486	12,443,252	1,056,299	14,334,265	1,545,402	3,213,562	439,484	4,564,982	10,484,513	73.1	3,849,752	2,962,025	2,477,890	2,374,428	3,094,398
	6 mos.	6,486	69,464,371	5,235,828	79,466,026	6,942,699	19,031,346	2,291,025	27,818,926	60,159,857	75.7	19,306,169	14,369,987	12,114,255	11,197,053	15,808,733
Staten Island Rapid Transit	June	23	31,960	78,318	119,126	14,803	20,419	1,689	81,319	130,543	109.6	—11,417	—33,017	—45,758	—47,146	—38,342
	6 mos.	23	281,009	464,434	790,067	77,798	124,809	10,474	516,458	804,289	101.8	—14,222	—139,172	—230,796	—283,991	—186,308
Bangor & Aroostook	June	603	280,201	12,953	314,142	93,185	79,759	7,013	91,744	295,009	93.9	19,133	—11,535	2,608	68,142	24,695
	6 mos.	603	3,186,013	118,738	3,431,436	584,018	540,811	31,934	857,330	2,156,692	62.8	1,274,744	929,314	892,603	1,334,124	1,025,179
Bessemer & Lake Erie	June	225	1,641,169	3,733	1,655,861	169,524	270,366	11,716	214,977	704,237	42.5	951,624	780,845	781,466	367,079	834,046
	6 mos.	225	5,473,801	21,299	5,567,478	716,167	1,649,925	68,635	1,013,805	3,679,144	66.1	1,888,334	1,426,348	1,687,277	869,112	2,009,735
Boston & Maine	June	1,988	2,718,851	588,185	3,841,060	560,664	624,574	66,476	1,440,755	2,892,855	75.3	948,205	661,146	492,730	602,817	629,481
	6 mos.	1,995	15,994,022	3,202,378	22,158,377	4,084,398	3,863,424	375,406	9,368,273	18,826,410	85.0	3,331,967	1,696,252	502,883	2,965,014	1,324,259
Brooklyn Eastern District Terminal	June	10.75	109,432	.....	111,756	8,241	13,350	758	29,673	58,140	52.0	53,616	45,552	45,552	33,857	.....
	6 mos.	10.75	617,040	.....	630,868	29,924	54,705	3,355	176,438	302,681	48.0	328,187	278,607	279,543	192,983	.....
Burlington-Rock Island	June	255	51,641	4,683	61,597	18,509	10,777	3,987	34,591	75,347	122.3	—13,750	—21,120	—29,133	—46,147	—27,158
	6 mos.	255	327,668	27,457	386,132	90,785	74,663	23,265	220,937	454,280	117.6	—68,148	—110,398	—162,670	—186,044	—149,786
Cambria & Indiana	June	37	86,502	.....	86,667	9,548	38,844	371	10,346	64,739	74.70	21,928	1,863	68,373	65,586	83,960
	6 mos.	37	584,730	.....	585,690	45,849	389,701	2,271	75,563	546,916	93.38	38,774	—66,678	348,258	469,745	442,992
Canadian Pacific Lines in Maine	June	233	91,587	14,352	118,996	73,355	30,933	9,481	55,075	176,292	148.1	—57,296	—66,406	—93,306	—61,157	—91,231
	6 mos.	233	1,097,587	82,216	1,250,826	260,279	279,364	57,684	490,098	1,131,720	90.5	119,106	65,613	—69,664	—30,827	—57,304
Canadian Pacific Lines in Vermont	June	85	60,479	9,376	81,334	17,672	30,753	4,214	54,656	112,919	138.8	—31,585	—38,927	.....	.....	—57,596
	6 mos.	85	379,672	44,007	487,614	124,993	168,488	25,710	352,325	705,143	144.6	—217,529	—259,347	.....	.....	—370,375
Central of Georgia	June	1,926	1,005,071	106,565	1,229,809	161,178	280,534	54,361	503,508	1,078,933	87.7	150,876	47,111	13,195	—10,538	77,376
	6 mos.	1,926	6,004,505	663,152	7,568,651	961,371	1,635,883	314,963	3,144,432	6,552,969	86.6	1,015,682	437,104	268,092	157,292	653,188
Central of New Jersey	June	681	1,940,692	369,954	2,485,911	194,785	499,965	52,167	1,064,246	1,935,103	77.8	550,808	186,009	47,202	408,474	173,509
	6 mos.	681	12,452,766	2,053,529	15,472,646	1,192,763	3,130,798	278,251	6,656,753	11,954,722	77.3	3,517,924	1,479,672	595,952	1,778,759	1,362,689
Central Vermont	June	453	420,030	33,104	494,587	115,731	91,102	15,341	233,672	478,402	96.7	16,185	7,413	—4,039	87,114	18,457
	6 mos.	454	2,375,776	173,824	2,790,405	520,430	567,701	86,979	1,421,396	2,734,517	98.0	55,888	—50,339	—53,313	159,619	111,077
Chesapeake & Ohio	June	3,106	10,115,244	299,080	10,855,982	1,035,838	1,916,933	185,746	2,289,759	5,766,709	53.1	5,089,273	3,907,944	3,785,880	3,981,218	4,473,776
	6 mos.	3,106	59,525,478	1,614,530	63,283,884	6,143,080	11,636,731	1,137,501	13,872,607	34,712,446	54.9	28,571,438	22,503,345	22,788,405	17,732,880	27,000,210
Chicago & Eastern Illinois	June	931	911,945	102,705	1,165,110	155,396	186,234	56,024	454,119	920,097	79.0	245,013	170,013	35,571	—29,096	84,193
	6 mos.	931	6,066,253	598,914	7,577,948	866,025	1,348,545	331,539	2,958,438	5,884,318	77.7	1,693,630	1,243,630	393,592	208,268	690,399
Chicago & Illinois Midland	June	131	269,498	835	276,530	31,328	52,624	15,991	65,750	182,635	66.0	93,895	78,800	80,946	61,884	94,555
	6 mos.	131	1,631,727	8,056	1,677,855	158,631	328,918	102,371	443,438	1,138,842	67.9	539,013	451,169	456,384	438,289	538,127
Chicago & North Western	June	8,355	6,430,937	1,059,968	8,322,142	2,065,949	1,903,275	184,033	2,826,903	7,308,258	87.8	1,013,884	361,200	158,922	—392,428	576,268
	6 mos.	8,355	32,545,893	4,721,551	41,761,255	7,800,252	10,215,050	953,924	17,447,121	38,418,163	92.0	3,343,092	—429,597	—1,570,468	275,273	928,013
Chicago, Burlington & Quincy	June	9,013	5,913,151	714,428	7,488,032	1,380,304	1,439,191	271,787	2,655,401	6,114,180	81.7	1,373,852	690,836	263,655	—737,660	645,212
	6 mos.	9,015	35,764,296	3,560,527	43,963,246	6,213,001	8,280,765	1,412,548	16,627,819	34,655,081	78.8	9,308,165	5,420,763	3,221,621	653,027	5,516,710
Chicago Great Western	June	1,512	1,382,617	47,007	1,527,592	216,039	203,913	51,594	513,578	1,038,369	68.0	489,223	406,066	197,111	9,947	239,149
	6 mos.	1,512	7,475,248	277,369	8,315,801	1,304,385	1,241,723	315,996	3,340,663	6,516,723	78.4	1,799,078	1,358,536	266,784	—47,519	514,804
Chicago, Indianapolis & Louisville	June	572	657,812	40,410	790,133	81,021	196,933	28,207	306,027	648,082	82.0	142,051	98,169	—4,758	4,567	36,699
	6 mos.	572	4,082,931	298,651	4,934,794	445,250	1,192,996	171,649	1,968,037	3,989,058	80.8	945,736	712,881	88,184	—55,736	337,773

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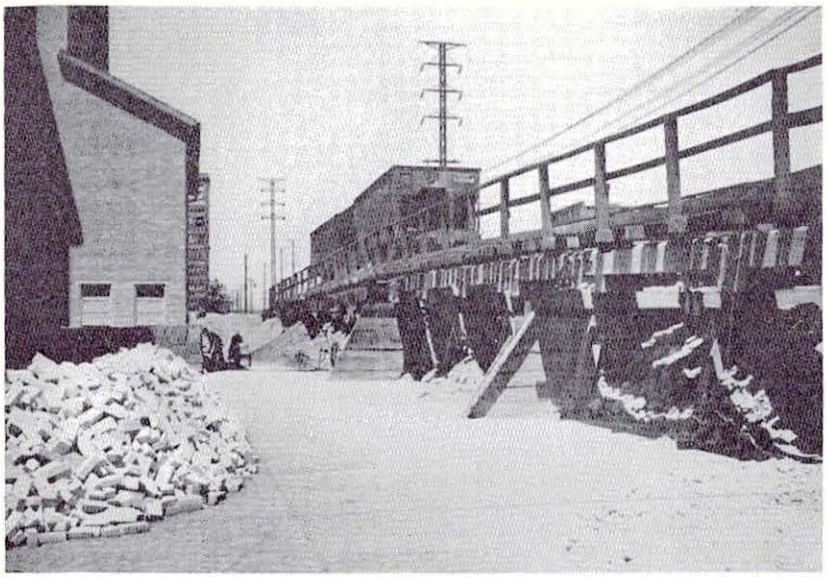
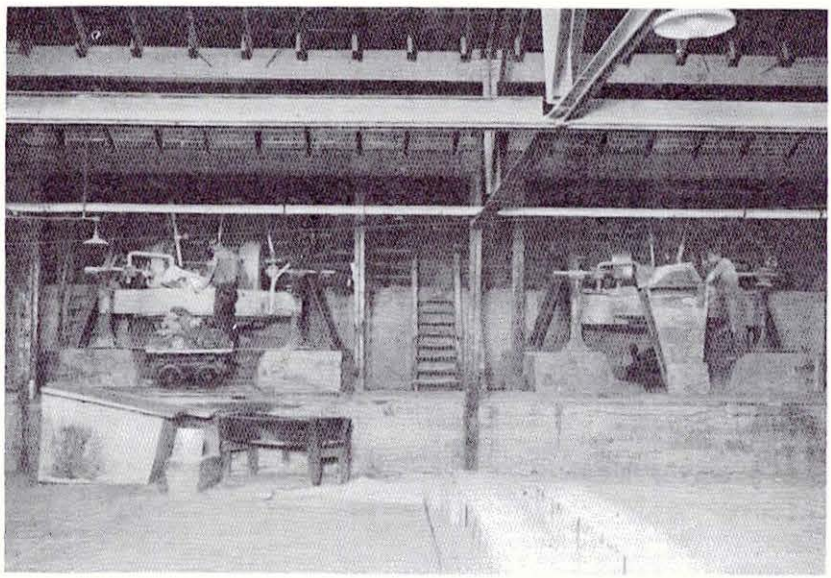
NO. 2 OF A SERIES ON THE MANUFACTURE OF SECURITY ARCH BRICK

CAREFUL CLAY PROPORTIONING AND THOROUGH MIXING AND GRINDING



The several kinds of clay used in Security Arch Brick are transported by rail from distant points to the brick plant. It is dumped in separate bins to permit accurate proportioning for maximum brick service life.



makes uniform Long Life Brick

Security Arch Brick render consistently long service in the firebox.

One of the reasons for this is the careful clay selection. This clay must be transported by rail from deposits in many cases considerable distances from the plant. Next is thorough mixing and grinding to provide uniform brick structure and uniform brick.

As in alloy steel, this uniform structure means uniform strength and dependable service.

It is a big factor in the long mileage and low cost service the Security Arch delivers in the firebox.

There's more to Security Arches than just brick

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED

Locomotive Combustion Specialists » » »

Revenues and Expenses of Railways

MONTH OF JUNE AND SIX MONTHS OF CALENDAR YEAR 1936—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures	Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: After depr.& retir. 1936	1935	Before depr.& ret.
Chicago, Milwaukee, St. Paul & Pacific.	June	11,129	$7,643,274	$676,028	$9,180,362	$2,295,334	$1,629,659	$230,489	$3,137,669	$7,642,070	83.2	$1,538,292	$798,292	$316,788	—$1,026,467	$763,870
	6 mos.	11,127	42,329,712	3,226,859	50,258,662	8,374,339	9,784,885	1,227,011	19,835,315	41,177,929	81.9	9,080,733	5,074,733	2,123,177	1,103,604	4,811,895
Chicago, Rock Island & Pacific	June	7,574	5,122,219	567,095	6,320,342	937,805	1,523,743	211,306	2,491,881	5,557,123	87.9	763,219	280,077	—5,816	—577,727	351,102
	6 mos.	7,574	27,806,991	3,303,383	34,654,169	4,516,001	8,728,070	1,168,994	15,357,126	32,116,816	92.7	2,537,353	—227,156	—1,929,958	—1,669,907	221,946
Chicago, Rock Island & Gulf	June	626	272,517	24,980	379,340	62,938	28,788	16,038	128,087	263,161	69.4	116,179	92,031	39,620	8,703	43,600
	6 mos.	626	1,429,493	161,904	2,045,473	314,294	208,135	95,818	763,441	1,539,285	75.3	506,188	375,908	84,200	—77,999	108,624
Chicago, St. Paul, Minneap. & Omaha.	June	1,648	1,369,791	145,952	1,631,274	190,000	255,054	37,436	645,362	1,203,596	73.8	427,678	322,487	220,056	—135,100	269,619
	6 mos.	1,648	7,095,394	725,018	8,422,905	1,028,168	1,507,242	206,994	4,228,370	7,436,957	88.3	985,948	390,734	—229,725	—322,589	69,153
Clinchfield Railroad	June	309	428,619	4,493	438,313	40,263	114,196	17,323	86,601	272,705	62.2	163,608	111,907	156,913	123,080	200,468
	6 mos.	309	2,936,138	24,615	2,993,286	236,736	683,233	104,752	601,452	1,715,339	57.3	1,277,947	1,012,537	1,224,998	913,316	1,486,541
Colorado & Southern	June	1,021	510,990	35,173	597,356	98,428	119,495	12,365	233,229	498,544	83.5	98,812	31,242	4,147	—65,696	35,682
	6 mos.	1,021	2,762,966	161,379	3,234,428	393,414	667,347	77,033	1,349,843	2,692,988	83.3	541,440	166,441	50,779	—224,663	240,654
Fort Worth & Denver City	June	902	404,713	49,032	453,068	49,775	87,018	20,431	143,700	336,651	74.3	116,417	81,055	52,922	—4,005	70,360
	6 mos.	902	2,464,241	231,756	2,698,345	246,637	512,565	106,287	906,280	1,983,556	73.5	714,789	516,422	341,402	47,543	447,565
Columbus & Greenville	June	167	82,135	5,613	93,349	17,844	16,057	3,540	32,568	80,062	85.8	13,287	9,813	8,311	—4,739	11,106
	6 mos.	167	456,971	34,355	522,399	102,278	88,274	22,286	210,551	483,429	92.5	38,970	19,002	11,692	—28,704	28,457
Delaware & Hudson	June	830	1,876,965	72,570	2,039,260	287,208	491,943	53,183	716,376	1,684,786	82.6	354,474	210,634	218,295	275,983	308,988
	6 mos.	831	11,296,354	512,420	12,318,578	1,649,836	3,001,395	274,378	4,692,014	10,432,338	84.7	1,886,240	1,096,793	1,159,086	1,237,851	1,712,764
Delaware, Lackawanna & Western	June	984	3,053,297	582,798	4,124,402	469,557	757,372	124,635	1,755,156	3,282,438	79.6	841,964	506,964	481,661	298,971	704,075
	6 mos.	989	18,349,908	34,054,498	24,448,940	2,132,758	4,565,540	696,558	11,187,122	19,699,154	80.6	4,749,786	2,740,786	2,643,749	2,317,572	3,980,084
Denver & Rio Grande Western	June	2,584	1,542,454	116,737	1,768,684	484,116	566,789	54,902	602,382	1,768,321	99.98	363	—186,387	—239,776	—126,405	—143,769
	6 mos.	2,584	9,766,279	620,074	10,940,347	1,749,840	3,296,135	307,254	3,801,550	9,628,284	88.0	1,312,063	192,124	—113,631	233,268	464,596
Denver & Salt Lake	June	232	121,744	5,247	135,568	52,683	80,354	2,661	47,253	175,369	129.4	—39,801	—61,947	—15,036	82,347	—10,171
	6 mos.	232	1,138,528	46,110	1,235,691	203,293	404,568	13,437	328,664	983,309	79.6	252,382	133,662	361,545	470,494	392,885
Detroit & Mackinac	June	242	57,223	2,608	67,026	15,559	11,284	962	22,067	53,074	79.2	13,952	11,412	8,124	—1,218	10,988
	6 mos.	242	254,120	16,414	305,225	57,884	62,361	5,510	134,533	280,268	91.8	24,957	19,758	984	—12,499	18,672
Detroit & Toledo Shore Line	June	50	270,162	.....	271,442	37,779	29,730	7,785	68,194	151,008	55.6	120,434	96,284	48,571	56,385	54,130
	6 mos.	50	2,059,388	.....	2,069,117	167,206	159,055	46,737	485,326	902,947	43.6	1,166,170	961,637	613,123	544,297	646,478
Detroit, Toledo & Ironton	June	472	529,027	341	550,446	64,977	73,530	10,767	123,969	300,252	54.5	250,194	197,862	166,815	165,092	188,501
	6 mos.	472	3,995,898	1,457	4,083,222	362,823	499,652	63,678	855,303	1,928,575	47.2	2,154,647	1,732,696	1,498,826	1,916,787	1,629,542
Duluth, Missabe & Northern	June	558	2,335,650	1,701	2,642,837	196,392	217,527	3,738	337,239	805,579	30.5	1,837,258	1,600,152	1,595,815	1,125,381	1,670,539
	6 mos.	559	4,827,134	14,897	5,517,122	789,180	1,254,746	21,788	1,213,289	3,558,453	64.5	1,958,669	1,096,700	1,098,200	741,396	1,548,022
Duluth, Winnipeg & Pacific	June	178	100,881	1,621	105,568	37,363	17,352	1,867	38,923	99,806	94.5	5,762	—2,157	—17,093	—30,507	—14,021
	6 mos.	178	658,319	11,390	685,976	136,475	111,634	10,744	280,021	564,815	82.3	121,161	75,455	—24,925	—70,894	—5,737
Elgin, Joliet & Eastern	June	434	1,237,356	.....	1,507,325	152,821	344,781	13,916	542,957	1,102,386	73.1	404,939	276,672	252,155	138,782	326,894
	6 mos.	434	7,827,410	12	8,957,424	811,902	1,893,865	82,528	3,165,018	6,234,101	69.6	2,723,323	1,994,529	1,853,659	1,416,983	2,303,859
Erie	June	2,297	5,994,597	441,246	7,024,063	673,206	1,318,390	171,895	2,429,334	4,897,976	69.7	2,126,087	1,631,555	1,349,811	1,190,768	1,672,497
	6 mos.	2,297	34,388,190	2,529,418	39,929,338	3,304,092	7,662,139	1,011,166	14,864,293	28,658,138	71.8	11,271,200	8,677,922	7,235,662	5,984,336	9,181,951
New Jersey & New York	June	45	18,442	48,536	69,084	5,950	15,776	507	47,754	72,059	104.3	—2,975	—8,242	—24,778	—28,852	—24,767
	6 mos.	45	98,871	288,997	399,278	28,928	89,857	3,623	296,683	429,232	107.5	—29,954	—58,172	—153,279	—218,852	—153,213
New York, Susquehanna & Western.	June	215	220,304	24,357	256,160	30,251	34,566	4,844	113,780	197,924	77.3	58,236	33,154	1,941	61,960	7,560
	6 mos.	215	1,557,873	144,057	1,779,725	157,381	217,353	28,589	780,802	1,265,849	71.1	513,876	373,792	213,173	214,506	247,876
Florida East Coast	June	712	294,677	83,320	427,415	103,001	119,490	20,316	162,132	446,990	104.6	—19,575	—98,246	—157,393	—255,399	—100,117
	6 mos.	712	3,119,475	1,563,214	5,242,437	602,391	771,466	139,423	1,605,734	3,466,352	66.1	1,776,085	1,305,109	997,111	540,435	1,341,422
Fort Smith & Western	June	249	48,239	1,612	52,416	16,442	8,726	5,661	18,329	52,232	99.7	184	—597	—7,042	—12,171	—6,476
	6 mos.	249	332,052	5,541	357,697	90,413	53,512	32,217	119,841	315,725	88.3	41,972	32,191	—7,593	—45,931	—4,181
Georgia Railroad	June	329	277,832	13,121	313,048	30,497	60,604	17,068	134,742	256,293	81.9	56,755	50,420	56,383	55,431	67,635
	6 mos.	329	1,517,144	75,912	1,734,681	173,635	358,273	103,042	754,746	1,471,461	84.8	263,220	225,409	278,895	264,710	347,437
Georgia & Florida	June	408	90,043	2,629	96,427	25,752	17,065	8,359	36,274	93,214	96.7	3,213	—3,915	—6,461	7,530	—1,224
	6 mos.	408	492,239	12,607	528,606	136,899	99,469	49,667	206,198	526,080	99.5	2,526	—36,527	—44,210	—11,818	—12,765
Grand Trunk Western	June	1,032	1,897,762	77,189	2,116,265	301,848	380,066	36,767	737,006	1,544,457	73.0	571,808	470,484	382,505	206,203	470,820
	6 mos.	1,032	11,028,371	418,532	12,303,768	1,361,277	2,238,509	210,825	4,727,126	9,067,949	73.7	3,235,819	2,607,858	2,215,521	1,126,840	2,791,433
Canadian Nat'l Lines in New Eng.	June	172	81,916	5,034	97,600	48,560	18,511	2,551	60,268	138,971	142.4	—41,371	—56,845	—84,101	—80,787	—81,058
	6 mos.	172	557,840	25,890	638,885	245,911	126,302	14,540	361,505	802,422	125.6	—163,537	—250,679	—413,581	—415,469	—395,788
Great Northern	June	8,176	7,067,548	495,312	8,302,690	992,871	1,194,662	198,159	2,248,828	4,914,557	59.2	3,388,133	2,610,288	2,570,998	1,839,460	2,873,332
	6 mos.	8,238	31,452,259	2,245,616	36,886,929	3,680,498	6,702,075	1,072,244	13,298,384	26,351,337	71.4	10,535,592	7,230,125	6,809,260	5,788,086	8,651,861

Continued on next left-hand page

The Superheater

AS A FACTOR IN LOCOMOTIVE DESIGN

Each of the following features is being discussed in this series of advertisements.

Maximum Ton Miles per Hour

•

Boiler Capacity and Tractive Effort

•

Heating Surface and Boiler Capacity

•

Heating Surface and Boiler Efficiency

•

Minimum Draft Loss and Low Back Pressure

•

High Sustained Superheat

•

Higher Superheat and Minimum Steam Consumption

•

Greater Sustained Capacity

•

Reduced Fuel and Water Consumption per Unit of Work Done

•

Total Fuel Consumption of American Railroads

•

Reduced Cost of Locomotive Horsepower

For High Efficiencies Use Elesco Type "E" Superheaters

✓ ✓ ✓ ✓ ✓ ✓ ✓

7

High Superheat and Minimum Steam Consumption

Low steam consumption per horsepower depends largely upon high sustained superheat.

With superheaters developing 200 deg. F. of superheat, there is a saving of 35% in steam per horsepower hour as compared with saturated steam. With the type "E" superheater, superheat of 350 deg. F. is possible at high rating and without sacrifice of evaporative capacity, producing a further saving of 15%.

The steam consumption per i.hp-hr. obtained on a test with a modern high-speed freight locomotive, operating at 50% cutoff, showed the following results:

STEAM TEMPERATURE	STEAM PER I.HP-HR.	SAVING IN STEAM From the Use of Superheat
Saturated Steam	28 lb.	—
150° Superheat	21 lb.	25.0%
200° Superheat	18 lb.	35.6%
250° Superheat	16 lb.	43.0%
350° Superheat	14 lb.	50.0%

THE SUPERHEATER COMPANY

Representative of American Throttle Company, Inc.

60 East 42nd Street
NEW YORK

ELESCO

Peoples Gas Building
CHICAGO

Canada: The Superheater Company, Limited, Montreal

Superheaters • Superheated Steam Pyrometers • Exhaust Steam Injectors • Feed Water Heaters • American Throttles

"Arctic" BRONZE
CROWN BEARINGS

CHILL CAST

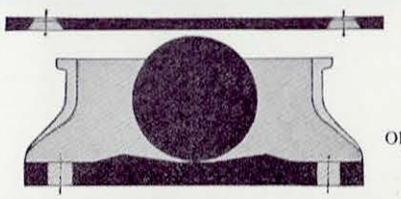
METAL MOULDS

WRITE FOR PRINT LISTING SIZES
NATIONAL BEARING METALS CORP.
ST. LOUIS, MO.
New York, N. Y. Jersey City, N. J. Pittsburgh, Pa. Meadville, Pa. Portsmouth, Va. St. Paul, Minn.

VAPOR Products

STEAM COUPLERS ARA Standard
VAPOR SYSTEM Thermostatic Control
FLEXIBLE CONDUITS In place of Steam Hose
CONTROLS for Air Conditioning
VAPOR CAR HEATING CO., Inc.
RAILWAY EXCHANGE, CHICAGO

Steam and Electric Specialties for Passenger Car Heating
GOLD CAR HEATING & LIGHTING CO.
NEW YORK



STUCKI SIDE BEARINGS
Manufactured by
A. Stucki Co.
Oliver Bldg., Pittsburgh, Pa.
Canadian Representatives
The Holden Co., Ltd.
Montreal, Can.

EDGEWATER STEEL COMPANY
PITTSBURGH, PA.
Details of our products appeared in the following issues of *Railway Age* during 1934, 1935, 1936:
1935—Jan. 5, 26—Feb. 2, 16—March 16—April 6—May 11—June 15, 22, 29—July 20, 27—Aug. 24—Oct. 5—Nov. 2—Dec. 7, 21
1936—Jan. 4—Feb. 1, 15—March 7, 21—April 4, 18—May 2—June 6, 20, 27—July 4, 18

LOCOMOTIVE CRANES
CRAWLER CRANES
SHOVELS
OHIO
THE OHIO LOCOMOTIVE CRANE CO.
BUCYRUS OHIO

GET TOGETHER DEPARTMENT

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STEEL DUMP CARS
Air Operated
EIGHT—20-yd. WESTERN, built 1929
THREE — 30-yd. CLARK, built 1923
TEN — 10-yd. WESTERN, built 1927
In unusually good condition
Iron & Steel Products, Inc.
Railway Exchange Chicago
"Anything so long as it contains Iron or Steel"

BETTENDORF U TYPE CAST STEEL 30 TON SIDE FRAMES

These side frames are in unusually good condition, and can be purchased at a very attractive price. All kinds of reclaimed, reconditioned Freight Car Parts—Storage Tanks—Send Us Your Inquiries—
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IRON & STEEL PRODUCTS, Inc.
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Passenger Train Cars; all types
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"Anything so long as it contains IRON or STEEL"

FOR SALE

1000 car sets 70-ton ANDREWS full "U" Truck Frames. Cheap.
Also, Trucks complete.

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Name .....
Old Address .....
New Address .....
Position ..... Company .....

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Revenues and Expenses of Railways

MONTH OF JUNE AND SIX MONTHS OF CALENDAR YEAR 1936—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: After depr. & retir. 1936	After depr. & retir. 1935	Before depr. & ret.
Green Bay & Western	June	234	$132,940	$900	$140,946	$36,658	$12,175	$5,958	$46,023	$104,565	74.1	$36,381	$25,251	$15,558	—$7,980	$19,563
	6 mos.	234	745,823	4,626	780,207	169,541	94,647	35,229	269,836	594,150	76.1	186,057	129,685	87,101	74,393	111,617
Gulf & Ship Island	June	259	78,184	9,909	92,707	15,803	14,980	3,265	56,404	95,478	103.0	—2,771	—18,162	—28,032	—3,528	—24,284
	6 mos.	259	592,562	48,372	719,922	106,813	88,065	20,356	355,350	607,730	84.4	112,192	22,779	—36,382	—50,263	—12,256
Gulf, Mobile & Northern	June	936	523,916	26,023	575,290	46,720	86,461	32,424	152,907	345,170	60.00	230,120	171,120	110,428	79,137	129,451
	6 mos.	936	3,156,471	136,703	3,433,857	366,225	530,976	212,148	929,749	2,210,411	64.37	1,223,446	938,667	578,785	404,186	692,831
Illinois Central	June	4,972	6,383,435	717,418	7,702,571	831,911	1,779,167	218,764	2,798,793	6,034,909	78.3	1,667,662	1,033,341	773,612	887,802	1,315,728
	6 mos.	4,976	38,534,193	4,341,183	46,854,976	4,217,015	10,456,972	1,371,980	18,201,542	36,694,592	78.3	10,160,384	6,559,459	5,276,905	5,146,651	8,565,130
Yazoo & Mississippi Valley	June	1,619	1,093,421	76,407	1,238,883	105,305	192,536	32,136	457,035	841,250	67.9	397,633	260,476	168,392	51,148	211,687
	6 mos.	1,619	5,949,373	380,372	6,812,668	559,573	1,086,398	200,873	2,720,633	4,894,945	71.9	1,917,723	1,130,780	612,936	—39,330	868,952
Illinois Central System	June	6,592	7,476,856	793,825	8,941,454	937,216	1,971,703	250,900	3,255,828	6,876,159	76.9	2,065,295	1,293,357	953,266	945,450	1,538,677
	6 mos.	6,595	44,483,566	4,721,555	53,667,644	4,776,588	11,543,370	1,572,853	20,922,175	41,589,537	77.5	12,078,107	7,678,336	5,942,203	5,151,396	9,486,444
Illinois Terminal	June	508	380,800	63,597	484,527	62,447	67,275	16,838	150,219	316,006	65.22	168,521	130,691	114,481	64,723	133,665
	6 mos.	514	2,284,690	412,408	2,919,285	291,461	398,134	96,009	964,782	1,859,167	63.69	1,060,118	853,180	743,969	494,976	858,027
Kansas City Southern	June	878	1,059,285	18,987	1,174,999	106,223	174,004	49,205	315,351	709,537	60.4	465,462	377,462	306,290	103,958	335,567
	6 mos.	878	5,652,810	98,347	6,356,861	549,353	964,573	288,407	1,800,165	4,011,570	63.1	2,345,291	1,843,291	1,470,035	432,814	1,642,509
Kansas, Oklahoma & Gulf	June	326	189,114	540	192,411	34,949	19,188	7,805	41,714	89,716	46.6	102,695	82,790	63,744	20,891	65,832
	6 mos.	326	1,153,585	2,895	1,171,970	140,690	127,525	46,344	250,094	567,858	48.5	604,112	486,482	378,516	220,042	391,034
Lake Superior & Ishpeming	June	160	373,585	91	427,804	35,972	25,806	622	52,031	121,125	28.3	306,679	251,015	248,830	98,278	262,138
	6 mos.	160	818,865	561	926,513	153,901	169,283	3,406	189,457	552,231	59.6	374,282	210,729	202,814	19,747	282,596
Lehigh & Hudson River	June	96	126,955	101	127,650	18,844	21,996	3,667	44,275	95,615	74.9	32,035	19,865	7,664	14,824	11,466
	6 mos.	96	770,386	662	775,828	88,370	121,829	21,485	285,035	556,340	71.7	219,488	144,294	69,791	100,760	92,559
Lehigh & New England	June	218	303,756	263	306,765	36,568	78,511	6,245	120,650	257,045	83.8	49,720	37,613	39,169	152,813	57,186
	6 mos.	219	1,980,161	1,688	1,996,750	206,838	430,949	37,313	708,065	1,477,309	74.0	519,441	400,988	392,801	518,796	501,480
Lehigh Valley	June	1,331	3,636,029	198,758	4,118,147	251,953	695,298	111,080	1,611,864	2,828,874	68.7	1,289,273	1,082,130	902,761	631,828	1,093,855
	6 mos.	1,335	20,745,428	1,282,921	23,618,308	1,530,472	4,160,364	668,999	10,392,665	17,735,616	75.1	5,882,692	4,656,929	3,614,129	3,113,315	4,764,504
Louisiana & Arkansas	June	606	452,610	13,706	481,582	67,154	64,500	27,336	113,063	284,807	59.1	196,775	152,735	122,529	85,237	136,830
	6 mos.	606	2,602,699	56,609	2,762,332	367,713	388,812	167,326	695,602	1,716,645	62.1	1,045,687	797,065	663,409	456,775	749,468
Louisiana, Arkansas & Texas	June	255	120,169	281	125,877	37,070	11,089	4,740	36,189	92,329	73.4	33,548	28,950	12,567	14,953	13,303
	6 mos.	255	595,872	1,218	623,269	162,476	61,541	27,559	192,159	470,481	75.5	152,788	128,651	35,034	6,089	39,505
Louisville & Nashville	June	4,999	6,264,696	528,441	7,243,601	748,222	1,623,934	170,373	2,332,873	5,177,907	71.5	2,065,694	1,629,890	1,535,077	1,193,812	1,883,269
	6 mos.	5,004	36,558,112	2,999,644	42,683,913	4,372,101	9,906,314	1,095,086	14,574,902	31,848,651	74.6	10,835,262	8,060,474	8,141,764	6,265,658	10,233,101
Maine Central	June	1,046	717,675	93,943	897,408	171,012	163,400	15,429	357,098	749,519	83.5	147,889	80,574	22,959	175,671	67,435
	6 mos.	1,046	5,016,724	426,913	5,985,426	1,126,815	1,081,192	67,101	2,320,386	4,834,840	80.8	1,150,586	763,642	382,166	814,751	649,736
Midland Valley	June	351	101,321	9	103,589	21,552	18,181	2,163	26,789	73,908	71.3	29,681	20,952	15,730	11,477	17,866
	6 mos.	356	681,428	94	692,058	90,718	78,423	13,943	178,429	395,401	57.1	296,657	247,269	202,812	125,003	215,564
Minneapolis & St. Louis	June	1,579	809,318	10,390	851,774	105,072	119,992	36,433	290,867	591,590	69.5	260,184	206,757	160,064	—69,867	188,233
	6 mos.	1,602	3,923,682	69,158	4,202,888	512,385	727,247	211,795	1,809,761	3,481,286	82.8	721,602	476,546	200,533	—246,667	373,642
Minneapolis, St. Paul & S. S. Marie	June	4,296	2,110,152	133,235	2,432,586	356,694	391,864	65,330	842,458	1,763,682	72.5	668,904	492,540	347,403	92,880	448,807
	6 mos.	4,296	10,720,614	531,294	12,207,991	1,755,182	2,206,840	353,251	5,249,174	10,217,574	83.7	1,990,417	1,051,653	302,068	—496,952	914,253
Duluth, South Shore & Atlantic	June	550	290,511	12,173	338,260	33,866	36,899	4,344	95,817	175,761	52.0	162,499	149,440	138,014	94,376	145,688
	6 mos.	550	1,160,247	62,526	1,333,308	181,527	208,892	25,399	501,730	948,126	71.1	385,182	320,048	273,106	144,457	319,682
Spokane International	June	163	64,182	1,338	71,475	18,907	5,799	1,735	20,563	51,038	71.4	20,437	15,350	10,493	—1,862	12,125
	6 mos.	163	296,409	8,515	337,895	69,559	37,687	11,000	123,801	267,294	79.1	70,601	43,018	20,901	—33,710	29,570
Mississippi Central	June	150	73,102	1,230	76,420	11,963	12,017	6,757	20,357	56,192	73.5	20,228	16,314	12,824	9,765	15,073
	6 mos.	150	408,304	7,390	429,063	65,303	68,167	41,098	119,897	325,910	76.0	103,153	81,802	61,557	10,631	75,021
Missouri-Arkansas	June	364	77,198	1,215	84,003	21,847	9,857	4,352	26,113	67,500	80.4	16,503	13,493	5,729	4,013	6,561
	6 mos.	364	451,824	6,998	494,329	109,018	60,301	26,414	168,215	391,072	79.1	103,257	87,934	37,303	25,346	42,308
Missouri-Illinois	June	208	100,595	603	102,856	21,987	11,202	2,784	30,762	69,329	67.4	33,527	26,939	17,086	4,047	20,576
	6 mos.	208	506,985	3,561	520,571	110,655	72,871	14,634	175,064	401,818	77.2	118,753	83,739	29,101	36,153	50,196
Missouri-Kansas-Texas Lines	June	3,293	2,120,546	208,223	2,567,196	366,172	465,788	126,606	873,793	1,976,470	77.0	590,726	411,124	183,523	—72,964	290,630
	6 mos.	3,293	12,113,764	1,024,560	14,508,401	1,864,317	2,797,706	700,414	5,234,969	11,450,804	78.9	3,057,597	2,021,339	776,088	—575,162	1,418,559
Missouri Pacific	June	7,228	6,110,578	423,285	7,138,656	1,077,081	1,415,535	254,529	2,440,088	5,488,377	76.9	1,650,279	1,211,763	717,221	7,748	1,066,665
	6 mos.	7,228	35,653,229	2,248,028	41,421,556	5,450,989	8,485,541	1,407,652	15,393,728	32,540,449	78.6	8,881,107	6,319,886	3,449,465	1,492,645	5,550,655
Gulf Coast Lines	June	1,763	658,012	36,956	749,600	154,332	170,928	44,359	294,835	714,817	95.36	34,783	31,396	93,943	164,057	60,336
	6 mos.	1,763	5,967,920	197,327	6,493,648	962,142	1,116,363	259,228	1,962,410	4,586,011	70.62	1,907,637	1,529,486	778,246	430,493	983,634

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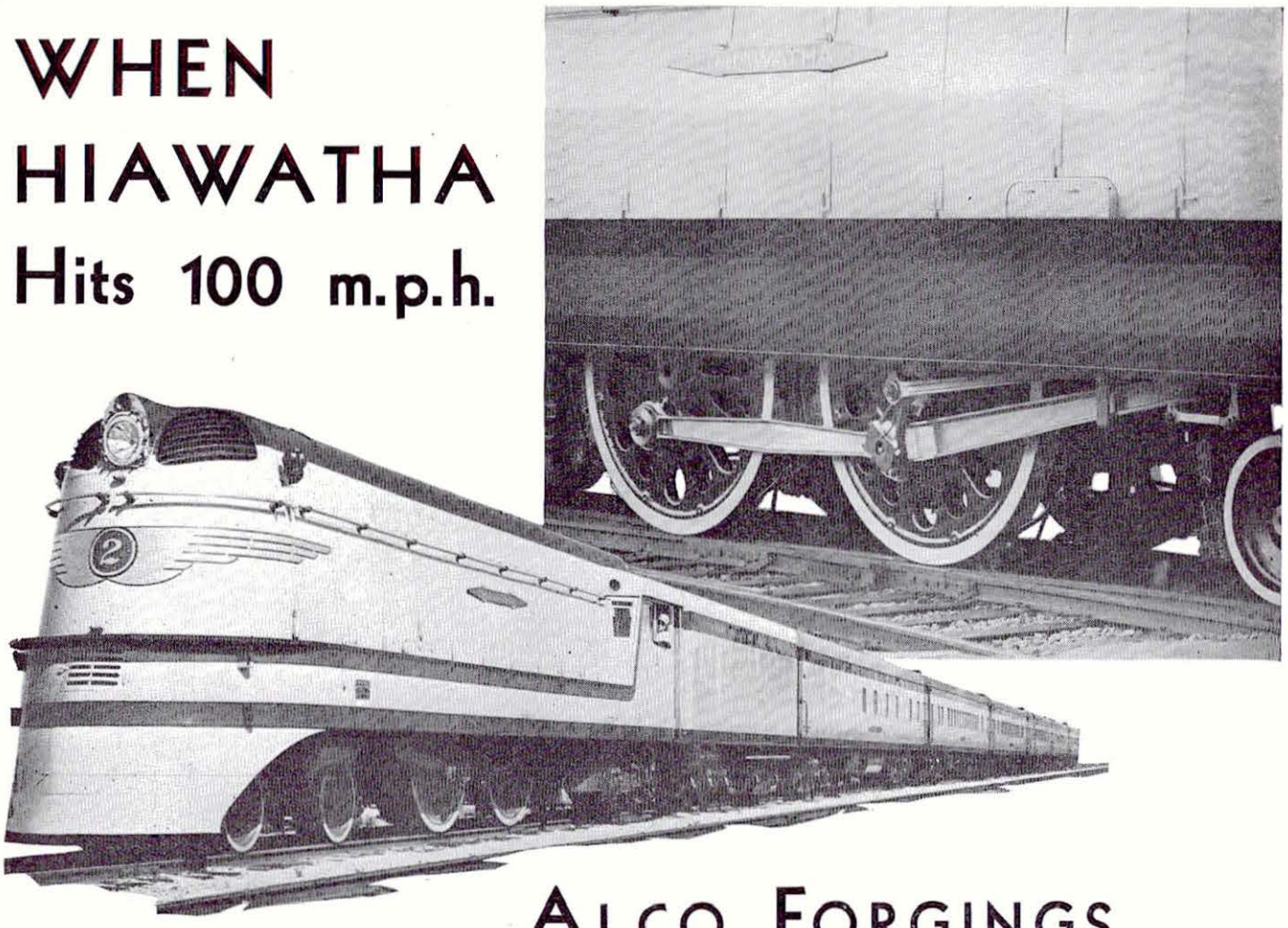
WHEN HIAWATHA Hits 100 m.p.h.



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Revenues and Expenses of Railways

MONTH OF JUNE AND SIX MONTHS OF CALENDAR YEAR 1936—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures	Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: After depr.& retir. 1936	1935	Before depr.& ret.
International Great Northern	June	1,154	$785,780	$79,274	$963,744	$144,723	$196,351	$29,715	$412,290	$837,200	86.87	$126,544	$72,826	—$15,461	—$31,021	$16,728
	6 mos.	1,154	4,828,576	377,050	5,787,032	845,438	1,166,498	179,107	2,415,184	4,932,937	85.24	854,095	553,678	—29,937	279,016	152,015
Mobile & Ohio	June	1,201	778,155	28,128	846,155	107,049	208,666	38,051	297,820	692,305	81.8	153,850	103,745	52,613	18,413	103,915
	6 mos.	1,201	4,483,921	149,432	4,908,990	618,046	1,092,064	242,628	1,839,564	4,035,695	82.2	873,295	591,276	265,482	—179,188	573,407
Monongahela	June	171	326,725	967	330,178	38,329	25,988	434	70,075	137,867	41.8	192,311	169,495	93,447	159,769	99,202
	6 mos.	173	2,286,177	5,374	2,303,802	213,100	176,670	2,574	488,898	901,364	39.1	1,402,438	1,271,532	774,195	645,092	808,851
Montour	June	57	194,645	101	195,240	21,917	54,536	962	39,518	123,779	63.4	71,461	52,205	73,828	101,091	84,857
	6 mos.	57	1,002,671	129	1,009,537	83,288	247,086	5,563	250,452	630,531	62.5	379,006	278,282	381,107	410,780	446,881
Nashville, Chattancoga & St. Louis	June	1,154	907,496	85,372	1,100,467	171,982	301,272	55,597	423,660	1,014,683	92.2	85,784	40,708	41,293	—7,772	85,668
	6 mos.	1,154	5,362,159	539,884	6,650,926	867,144	1,608,742	370,944	2,690,106	5,927,446	89.1	723,480	451,017	384,214	181,964	650,590
Nevada Northern	June	165	37,663	580	42,554	8,142	3,925	836	7,780	24,197	56.8	18,356	9,094	12,232	2,763	18,184
	6 mos.	165	238,045	7,976	274,985	49,254	19,919	5,160	56,704	154,530	56.1	120,455	72,411	89,280	14,750	124,955
New York Central	June	11,214	20,826,568	5,448,785	29,586,541	3,336,686	5,899,431	544,484	10,401,111	21,631,543	73.1	7,954,998	5,765,242	4,239,983	2,546,059	5,589,159
	6 mos.	11,214	122,787,510	29,596,066	171,616,006	16,844,610	37,188,677	3,163,646	64,478,412	130,424,829	76.0	41,191,177	28,397,565	19,688,552	15,039,674	27,779,783
Pittsburgh & Lake Erie	June	233	1,767,465	58,237	1,878,890	203,884	554,762	25,888	519,268	1,386,725	73.8	492,165	337,561	489,819	334,143	640,336
	6 mos.	233	9,007,135	339,471	9,599,992	880,586	2,983,301	155,922	3,147,966	7,667,338	79.9	1,932,654	1,134,425	2,176,036	1,710,416	3,078,492
New York, Chicago & St. Louis	June	1,704	3,137,133	83,630	3,337,425	355,843	487,898	114,161	1,049,078	2,144,711	64.3	1,192,714	937,987	657,484	505,568	785,970
	6 mos.	1,704	18,503,143	429,187	19,600,644	1,794,238	2,832,524	683,108	6,613,731	12,696,890	64.8	6,903,754	5,820,621	4,157,446	3,023,871	4,930,558
New York, New Haven & Hartford	June	2,033	3,698,582	1,891,824	6,295,193	842,903	1,086,735	140,049	2,362,182	4,818,538	76.5	1,476,655	986,655	452,594	952,154	738,618
	6 mos.	2,053	21,588,494	11,612,653	37,558,441	5,178,098	6,658,752	567,802	14,574,578	29,379,400	78.2	8,179,041	5,429,041	2,063,412	4,243,829	3,784,417
New York Connecting	June	20	194,364	.....	206,172	17,014	4,263	.....	28,822	51,554	25.0	154,618	119,563	90,781	113,422	90,781
	6 mos.	20	1,325,461	.....	1,396,488	64,225	44,314	.....	203,048	319,659	22.9	1,076,830	868,380	669,425	671,227	669,425
New York, Ontario & Western	June	566	636,672	30,941	719,930	76,015	135,763	13,513	281,173	531,904	73.9	188,026	139,710	102,523	161,144	127,279
	6 mos.	566	4,003,423	76,125	4,399,936	439,669	829,741	70,186	1,890,277	3,387,888	77.0	1,012,048	742,630	535,496	676,867	684,236
Norfolk & Western	June	2,166	7,231,344	188,576	7,647,836	1,033,944	1,114,327	131,635	1,544,100	4,002,454	52.3	3,645,382	2,348,202	2,585,984	2,360,630	2,962,403
	6 mos.	2,166	40,459,896	979,713	42,807,089	5,065,484	6,655,525	748,873	9,685,847	23,399,905	54.7	19,407,184	13,614,617	15,156,148	10,826,378	17,405,014
Norfolk Southern	June	834	481,991	7,838	505,581	73,001	50,284	21,768	154,478	318,910	63.1	186,671	155,184	126,826	184,653	137,931
	6 mos.	834	2,072,099	38,693	2,209,195	402,162	298,495	134,497	826,978	1,782,659	80.7	426,536	255,347	155,966	234,291	222,138
Northern Pacific	June	6,727	4,039,330	440,667	4,955,972	761,324	1,061,971	182,354	1,778,105	4,125,409	83.2	830,563	253,721	544,987	—218,353	805,671
	6 mos.	6,727	21,886,472	1,804,689	26,204,494	3,416,319	6,375,557	958,435	10,712,712	23,462,668	89.5	2,741,826	—469,967	1,454,822	—19,462	3,019,326
Northwestern Pacific	June	351	203,648	88,765	321,495	40,220	59,417	5,310	151,768	270,212	84.0	51,283	44,959	36,640	18,435	50,714
	6 mos.	351	1,066,225	423,541	1,653,079	256,091	313,020	24,641	887,379	1,563,841	94.6	89,238	19,644	—14,649	—181,229	68,613
Oklahoma City-Ada-Atoka	June	132	39,618	490	42,410	6,071	2,533	664	11,625	23,156	54.6	19,254	17,205	10,831	9,546	10,839
	6 mos.	132	257,263	2,240	272,623	42,050	9,896	4,358	65,629	133,005	48.8	139,618	125,217	92,769	32,450	92,813
Pennsylvania	June	10,371	27,389,166	5,256,798	36,013,833	3,349,826	7,302,588	637,573	12,218,185	25,436,741	70.6	10,577,092	7,559,456	6,707,931	6,243,634	8,547,295
	6 mos.	10,430	153,511,623	32,637,644	204,968,166	18,425,279	42,210,613	3,710,529	73,681,075	149,336,534	72.9	55,631,632	40,108,228	35,180,994	33,398,591	46,011,670
Long Island	June	396	527,851	1,613,182	2,244,406	154,859	373,262	21,947	931,924	1,552,090	69.2	692,316	352,619	186,389	172,741	283,492
	6 mos.	396	3,235,097	8,279,381	12,055,565	921,008	2,164,080	102,365	5,784,500	9,369,935	77.7	2,685,630	1,371,875	445,169	93,460	1,027,352
Pennsylvania-Reading Seashore Lines	June	412	212,307	254,031	490,513	54,338	68,913	22,618	291,698	465,329	94.9	25,184	—69,453	—164,154	—94,876	—156,884
	6 mos.	412	1,534,177	888,809	2,540,330	368,575	435,933	65,565	1,587,996	2,625,005	103.3	—84,675	—556,853	—1,008,611	—1,162,388	—964,890
Pere Marquette	June	2,115	2,351,039	76,372	2,577,893	340,509	544,104	62,372	878,048	1,926,003	74.7	651,890	410,804	316,363	220,360	526,572
	6 mos.	2,115	14,600,832	397,797	15,765,758	1,701,632	3,248,088	379,634	5,721,914	11,623,255	73.7	4,142,503	3,253,410	2,627,448	1,916,041	3,893,525
Pittsburg & Shawmut	June	103	29,435	122	30,036	9,962	15,329	1,222	11,917	41,245	137.3	—11,209	—12,679	—10,821	19,845	—5,010
	6 mos.	103	258,372	2,199	265,391	69,271	98,915	7,834	90,086	285,374	107.5	—19,983	—27,729	—13,800	56,208	21,067
Pittsburgh & West Virginia	June	138	301,822	.....	317,576	38,311	74,727	17,422	60,444	215,996	68.0	101,580	76,950	98,951	78,474	120,828
	6 mos.	138	1,709,678	.....	1,813,463	173,106	419,478	99,095	360,439	1,197,806	66.1	615,657	474,015	663,173	481,856	797,247
Pittsburg, Shawmut & Northern	June	190	77,029	24	78,700	25,490	15,557	1,423	28,503	77,469	98.4	1,231	—987	—6,242	10,849	—3,553
	6 mos.	190	493,731	327	502,632	106,456	100,013	8,324	189,450	444,395	88.4	58,237	44,812	10,093	26,691	26,199
Reading	June	1,456	4,150,090	299,830	4,657,778	331,042	791,267	80,135	1,700,973	3,132,980	67.3	1,524,798	1,065,136	1,129,932	1,330,250	1,394,582
	6 mos.	1,456	25,847,973	1,992,237	29,098,960	2,133,541	5,022,988	448,035	11,269,028	20,260,038	69.6	8,838,922	6,445,614	6,610,112	6,151,218	8,205,683
Richmond, Fredericksburg & Potomac	June	117	348,120	130,160	583,969	66,451	112,598	8,904	226,147	452,943	77.6	131,026	94,303	55,890	6,506	82,841
	6 mos.	117	1,930,212	1,156,261	3,874,888	366,242	756,847	55,238	1,583,262	3,051,829	78.8	823,059	590,003	288,772	304,577	450,756
Rutland	June	407	208,927	22,560	295,261	41,939	52,593	11,222	133,457	253,795	86.0	41,466	27,571	26,339	—4,714	37,783
	6 mos.	407	1,126,990	174,803	1,632,803	269,896	326,501	62,288	839,599	1,584,473	97.0	48,330	—28,620	—28,185	—94,604	41,122
St. Louis-San Francisco	June	4,928	3,313,615	325,437	3,974,752	584,874	950,727	122,770	1,422,450	3,271,539	82.3	703,213	380,628	355,528	—195,732	624,426
	6 mos.	4,928	18,455,083	1,507,707	21,947,385	3,253,902	5,415,440	674,416	8,218,468	18,618,287	84.8	3,329,098	1,605,106	1,687,523	—174,221	3,302,713

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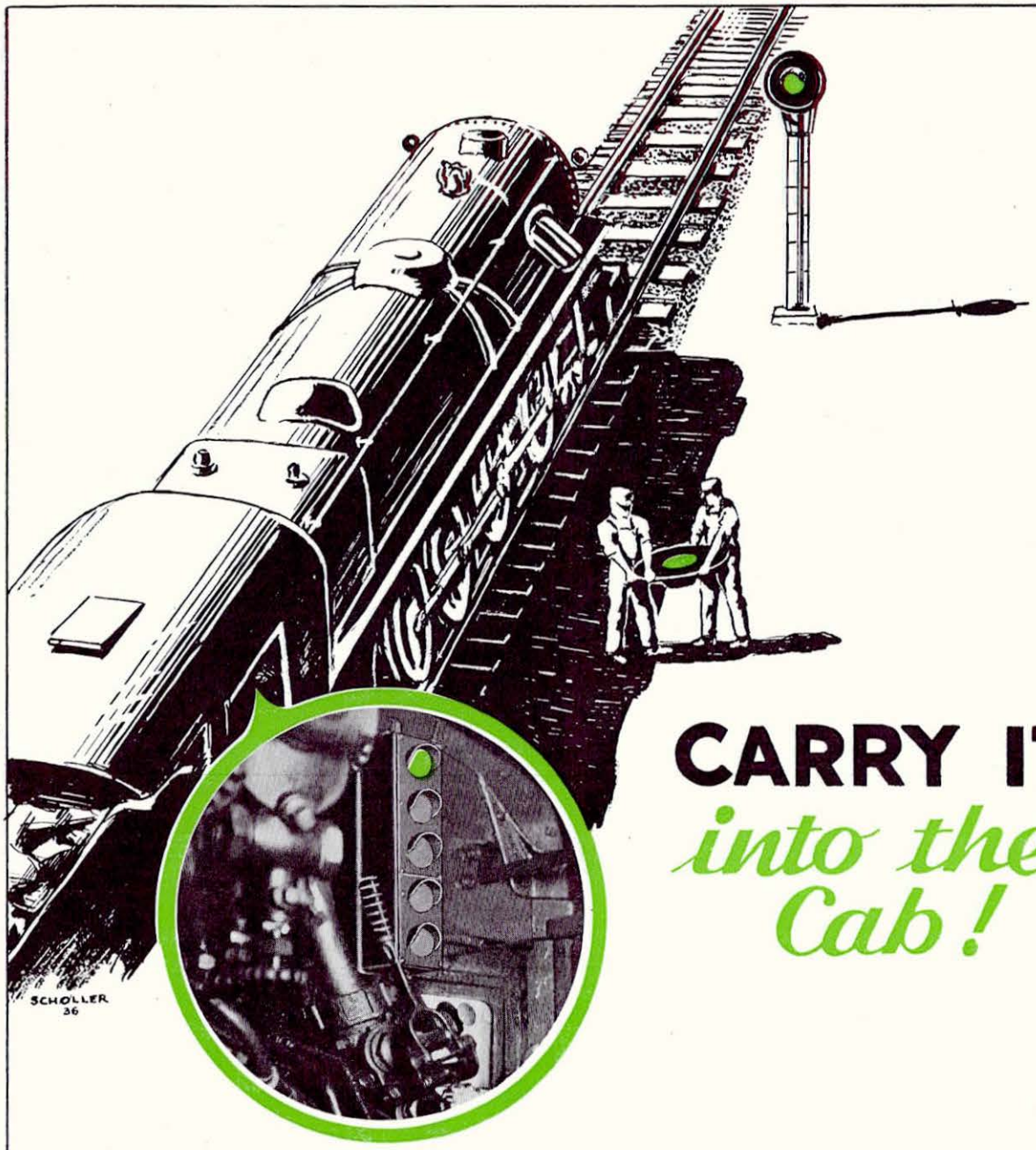

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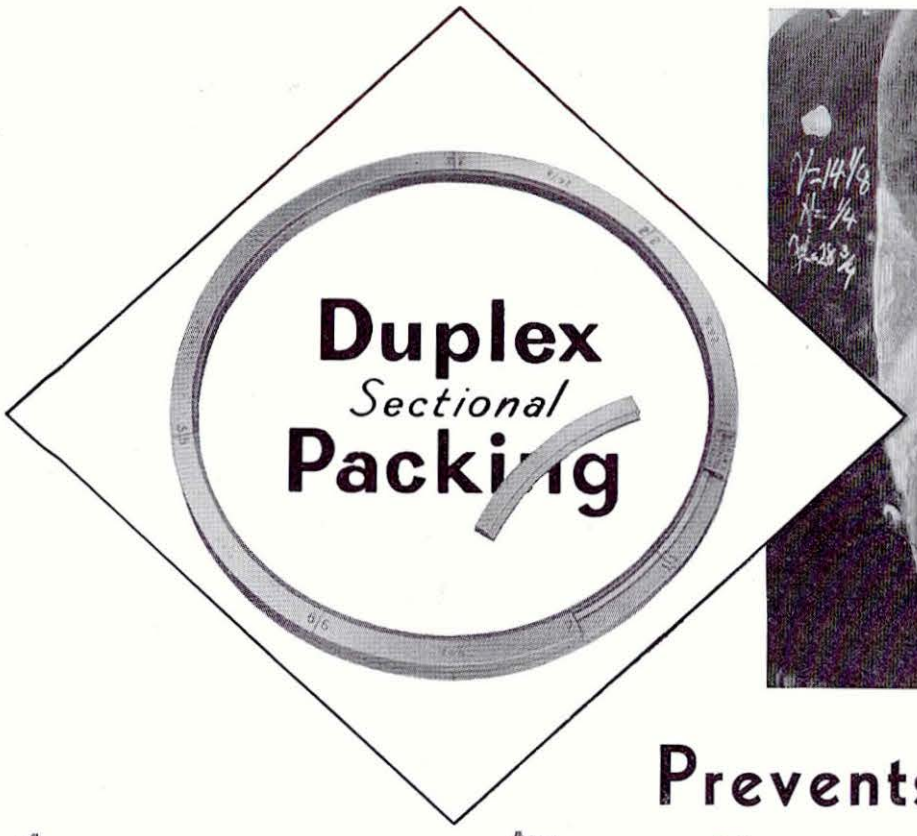
NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

Revenues and Expenses of Railways

MONTH OF JUNE AND SIX MONTHS OF CALENDAR YEAR 1936—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: After depr. & retir. 1936	1935	Before depr. & ret.
Fort Worth & Rio Grande	June	233	$38,096	$1,031	$45,658	$13,002	$8,441	$1,907	$21,470	$47,316	103.6	—$1,658	—$6,000	—$13,229	—$17,037	—$13,178
	6 mos.	233	187,515	4,485	233,250	87,486	48,722	13,115	140,484	307,555	131.9	—74,305	—99,819	—144,239	—144,659	—143,934
St. Louis, San Francisco & Texas	June	261	122,293	784	126,713	37,115	15,119	6,056	53,372	118,470	93.5	8,243	1,521	—32,029	—60,137	—31,927
	6 mos.	261	559,868	3,611	587,357	237,797	82,940	33,621	273,118	667,580	113.7	—80,223	—114,208	—305,587	—280,947	—304,721
St. Louis Southwestern Lines	June	1,784	1,572,492	24,999	1,658,097	216,811	244,454	79,641	497,502	1,111,032	67.0	547,065	446,545	279,016	152,786	329,340
	6 mos.	1,784	8,788,220	103,617	9,227,899	1,020,343	1,440,429	453,538	2,855,739	6,189,957	67.1	3,037,942	2,503,787	1,569,512	1,239,594	1,872,849
Seaboard Air Line	June	4,307	2,185,416	267,167	2,695,058	428,547	654,054	149,215	1,071,547	2,472,661	91.7	222,397	77,397	35,463	—41,108	192,269
	6 mos.	4,307	14,717,628	2,524,170	19,230,743	2,679,913	3,974,261	911,229	7,296,535	16,017,150	83.3	3,213,593	1,853,593	1,161,953	1,690,067	2,101,115
Southern Railway	June	6,641	5,962,634	844,810	7,445,568	957,049	1,458,466	150,230	2,638,252	5,503,105	73.9	1,942,463	1,518,444	1,247,593	861,121	1,518,323
	6 mos.	6,641	36,603,051	4,450,125	45,010,351	5,670,056	8,309,057	896,951	16,225,066	32,901,166	73.1	12,109,185	9,450,842	7,759,243	5,451,655	9,383,125
Alabama Great Southern	June	315	451,827	59,620	547,539	85,146	124,875	11,533	168,864	410,030	74.9	137,509	89,717	66,775	46,595	90,017
	6 mos.	315	2,560,292	269,002	3,058,310	500,547	661,259	67,492	982,904	2,327,293	76.1	731,017	503,458	370,038	75,485	509,473
Cinn., New Orleans & Texas Pacific	June	336	1,199,582	80,689	1,351,478	168,950	260,631	26,217	309,417	808,324	59.8	543,154	420,243	368,122	305,121	418,146
	6 mos.	336	6,872,766	586,174	7,912,405	1,038,682	1,445,464	154,458	1,942,852	4,864,075	61.5	3,048,330	2,419,074	2,221,516	1,504,540	2,521,236
Georgia Southern & Florida	June	397	130,023	24,881	171,200	32,941	43,030	1,846	74,611	157,807	92.2	13,393	834	—12,529	12,637	—5,480
	6 mos.	397	736,188	283,663	1,145,235	186,505	231,482	11,407	519,180	993,360	86.7	151,875	76,742	19,183	9,781	61,532
New Orleans & Northeastern	June	204	176,174	23,435	214,829	31,549	26,778	5,329	64,930	137,820	64.2	77,009	53,069	30,309	14,413	36,386
	6 mos.	204	1,066,077	104,851	1,265,815	176,320	198,779	32,574	417,753	887,346	70.1	378,469	239,801	111,500	42,961	148,094
Northern Alabama	June	100	50,005	1,795	53,609	11,777	1,544	1,219	16,523	32,721	61.0	20,888	17,095	7,037	8,625	7,106
	6 mos.	100	330,243	10,205	351,664	68,590	8,729	7,387	106,305	201,156	57.2	150,508	126,668	56,312	9,944	56,734
Southern Pacific	June	8,772	10,713,652	1,999,467	13,761,015	1,265,805	2,092,812	326,607	4,645,492	9,129,544	66.3	4,631,471	3,938,739	3,054,709	1,438,393	3,537,548
	6 mos.	8,773	53,125,760	9,676,744	68,140,055	6,923,869	12,111,750	1,838,342	25,391,983	51,019,136	74.9	17,120,919	11,816,200	8,376,327	6,148,762	11,266,627
Southern Pacific Steamship Lines	June	....	438,954	22,682	479,180	18,078	89,583	17,081	328,712	471,901	98.5	7,279	8,374	8,123	—49,356	43,491
	6 mos.	....	2,534,867	93,824	2,732,809	95,934	536,449	102,443	1,961,237	2,810,888	102.9	—78,079	—114,994	—116,504	—307,586	95,588
Texas & New Orleans	June	4,430	2,740,008	320,855	3,326,755	493,726	682,075	129,059	1,122,123	2,663,065	80.0	663,690	467,111	255,310	—91,748	395,141
	6 mos.	4,429	16,315,981	1,537,422	19,364,170	2,683,303	3,839,266	733,386	6,642,827	15,247,822	78.7	4,116,348	2,646,279	1,545,047	816,827	2,386,563
Spokane, Portland & Seattle	June	946	554,440	66,474	669,606	92,486	78,582	11,945	224,551	436,299	65.2	233,306	164,968	118,381	127,995	134,872
	6 mos.	946	2,985,839	238,268	3,520,097	436,529	471,180	54,147	1,327,035	2,454,949	69.7	1,065,147	648,634	354,687	524,540	453,662
Tennessee Central	June	286	175,954	5,966	192,234	34,368	26,663	5,149	60,482	136,290	70.9	55,944	49,194	38,223	24,368	44,192
	6 mos.	286	1,059,572	31,971	1,159,966	196,480	173,273	33,298	393,704	854,502	73.7	305,464	261,256	189,339	124,125	225,205
Texas & Pacific	June	1,949	1,825,128	256,867	2,261,843	256,156	425,492	86,473	694,247	1,597,728	70.6	664,115	514,781	385,002	374,301	482,602
	6 mos.	1,949	10,734,772	1,148,739	12,939,937	1,467,141	2,353,184	444,848	3,982,606	9,038,661	69.9	3,901,276	3,103,389	2,389,784	1,951,735	2,973,314
Texas Mexican	June	162	78,749	466	88,396	24,055	14,281	3,481	34,565	83,851	94.9	4,545	—1,753	—10,993	—2,436	—9,150
	6 mos.	162	616,097	2,723	677,079	110,487	90,959	19,803	210,032	474,210	70.0	202,869	167,566	127,543	150,328	138,571
Toledo, Peoria & Western	June	239	205,170	1	207,761	60,702	13,030	17,106	45,081	154,361	74.3	53,400	40,368	21,311	3,091	33,046
	6 mos.	239	1,129,843	55	1,145,131	292,684	74,560	100,020	278,750	806,288	70.4	338,843	271,167	166,668	43,632	236,294
Union Pacific System	June	9,824	9,029,359	1,555,014	11,711,825	1,250,894	2,199,909	390,481	3,591,013	8,262,407	70.5	3,449,418	2,332,564	1,797,973	505,447	2,331,070
	6 mos.	9,826	53,574,931	6,323,440	65,681,095	8,408,917	13,846,428	1,977,505	22,470,611	51,340,185	78.2	14,340,910	8,039,493	4,965,017	4,220,580	8,147,157
Utah	June	111	45,027	.....	45,056	12,220	19,665	248	11,886	48,765	108.2	—3,709	—10,222	—10,003	7,428	—178
	6 mos.	111	517,147	.....	519,180	87,695	136,793	2,726	127,625	382,684	73.7	136,496	75,161	65,898	25,032	124,830
Virginian	June	619	1,129,640	3,229	1,178,677	112,153	238,675	19,041	204,764	602,204	51.1	576,473	476,473	541,663	656,176	635,025
	6 mos.	619	7,860,198	21,386	8,197,903	619,558	1,479,212	110,745	1,417,514	3,813,916	46.5	4,383,987	3,618,987	3,916,839	3,372,880	4,476,370
Wabash	June	2,447	3,129,495	215,846	3,571,097	548,412	672,263	145,878	1,348,440	2,876,993	80.6	694,104	481,601	192,575	48,270	369,851
	6 mos.	2,447	19,338,367	1,181,788	22,181,125	2,609,648	4,112,426	849,626	8,451,544	16,962,955	76.5	5,218,170	4,052,787	2,324,477	2,227,134	3,392,283
Ann Arbor	June	293	300,789	3,838	316,993	33,518	69,918	11,556	126,668	253,874	80.1	63,119	46,230	35,836	38,064	55,828
	6 mos.	293	1,851,460	16,647	1,919,740	173,005	434,974	70,491	835,597	1,589,833	82.8	329,907	227,606	156,836	228,745	277,594
Western Maryland	June	882	1,220,735	7,300	1,253,876	186,265	264,187	37,084	306,053	843,292	67.3	410,584	310,584	315,182	317,489	410,231
	6 mos.	882	7,602,178	39,385	7,845,363	975,829	1,739,524	221,173	1,999,985	5,235,158	66.7	2,610,205	2,040,205	2,109,269	1,984,266	2,679,484
Western Pacific	June	1,207	971,297	43,083	1,061,250	448,437	259,283	63,908	429,162	1,245,128	117.3	—183,878	—272,521	—343,423	—57,705	—291,194
	6 mos.	1,207	5,676,731	192,182	6,053,931	1,523,041	1,301,666	342,401	2,590,261	6,019,949	99.4	33,982	—436,931	—853,767	—177,231	—545,893
Wheeling & Lake Erie	June	511	1,220,914	1,511	1,295,118	210,672	259,995	30,319	362,334	896,824	69.2	398,294	260,712	328,120	249,888	395,191
	6 mos.	511	6,635,485	9,408	7,008,386	985,098	1,787,912	182,937	2,104,349	5,252,234	74.9	1,756,152	1,037,537	1,189,914	927,586	1,751,355
Wichita Falls & Southern	June	203	45,966	36	53,966	8,361	6,178	1,553	14,250	33,389	61.87	20,577	17,140	14,779	14,737	16,721
	6 mos.	203	216,142	752	251,648	49,072	35,839	9,793	84,107	197,948	78.66	53,700	34,738	22,333	21,639	34,027



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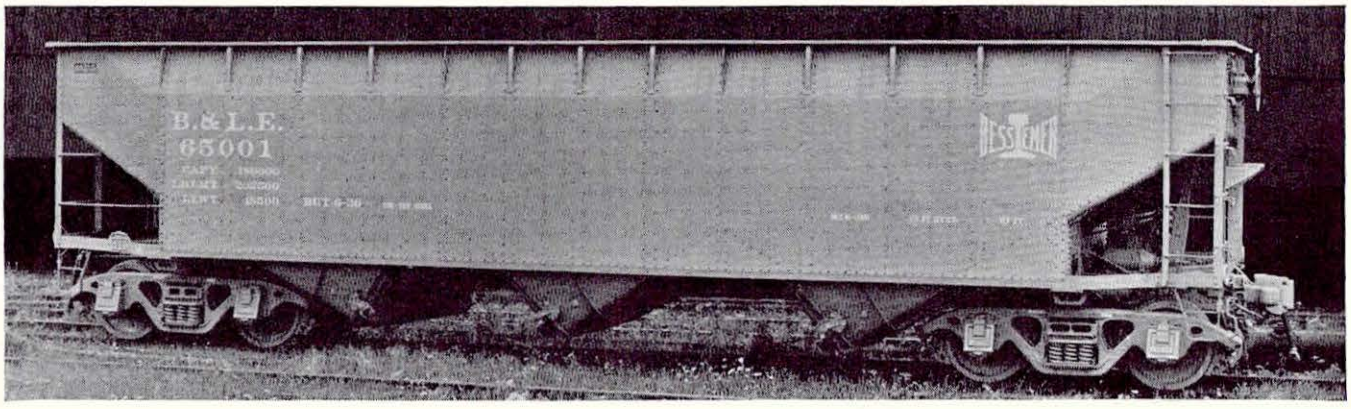

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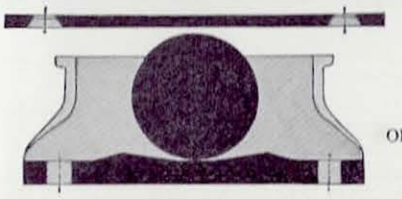

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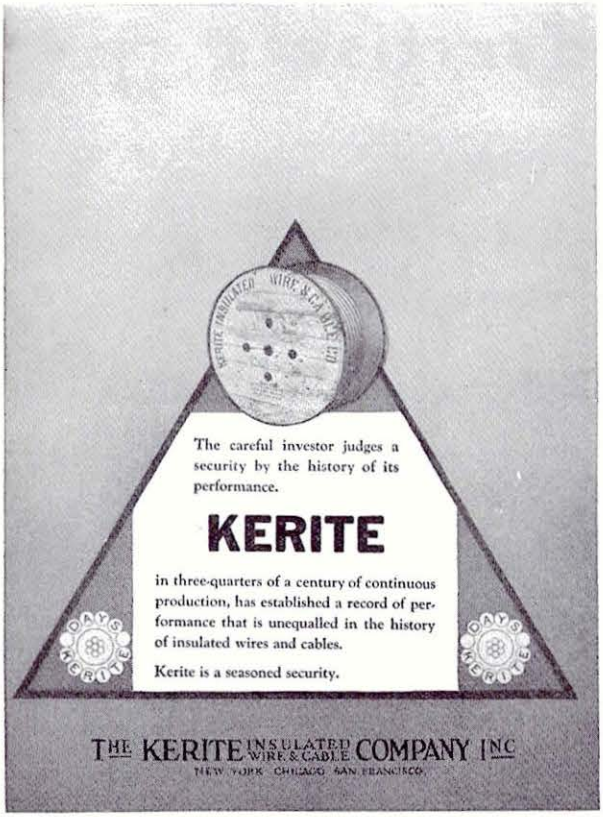
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AND

Bronze Engine Castings

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FLAG

your Frame Failures with Nickel!

LOCOMOTIVE frame failures are one of the most serious types of defects with which railroad mechanical departments have to deal. Frames do not wear out. They break . . . usually as a result of repeated stresses and shocks.

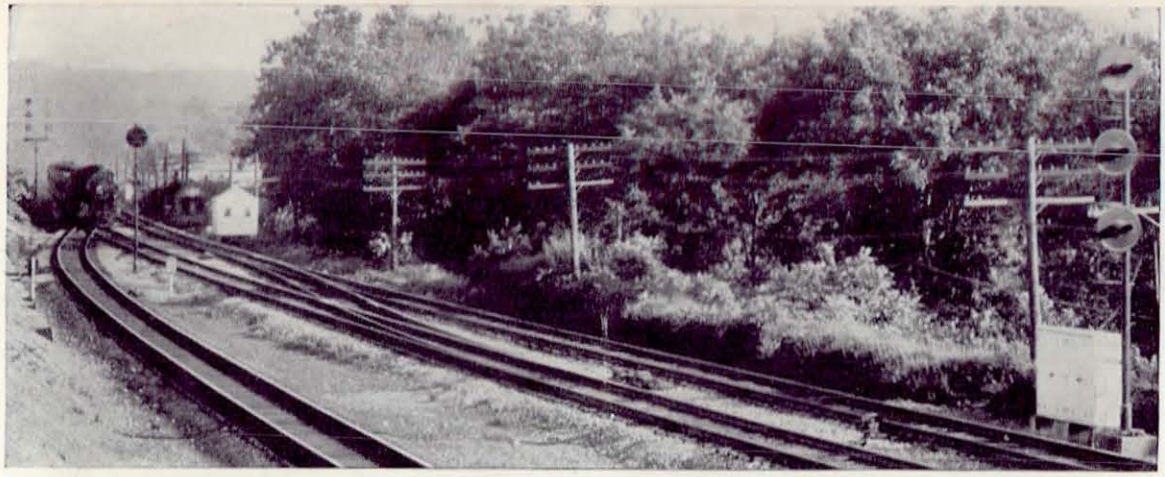
The best modern practice is to *toughen* these important castings with Nickel. Cast Nickel Alloy Steel gives extremely high impact and fatigue values, and because of its greater resistance to stress concentration, frame failures are reduced.

In addition to frames, there are a host of applications where strong, tough, enduring alloys of Nickel will lengthen the life of equipment and lower maintenance costs.

We invite consultation on the use of Nickel Alloy Steels, Nickel Cast Irons and other alloys containing Nickel in railroad service.

CAST IRONS **NICKEL** **ALLOY STEELS**

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N.Y.



SIGNALING FOR HIGH-SPEED TRAIN OPERATION*

The advance in scheduled high-speed train service in this country in the past five years is without parallel in the world. From about 30 regular runs in 1930 timed at 60 m.p.h. and over, the number at the end of 1935 had increased to over 400. . . . Practically all of the high-speed mileage is on territory equipped with automatic block signals, two-thirds of the railways are equipped with automatic train control or cab signals, and the majority of the railways have either centralized traffic control or train operation by signal indication without train superiority.

During the winter of 1935-1936, 184 high-speed passenger trains, scheduled at 62 m.p.h. and over, were operated on 15 of 43 routes covering 30,109 route miles under the protection of the following modern signal systems:

Type of Signaling	*Route Miles*
Automatic block signals	*28,413*
Automatic train control (including automatic train stop and speed control)	*6,888*
Cab signals	*5,823*
Centralized traffic control	*401*
Train operation by signal indication	*1,958*

* Excerpt of paper presented before the American Association of Railroad Superintendents, June 16, 1936. Copies of paper are available.

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

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HISTORY IN THE MAKING

In 1865 the U. S. patent office issued patent for an "Improvement in construction of railway trains and cars," to Mr. Samuel R. Calthorp, which Mr. Calthorp described in part as "Giving to the exterior surface of a railway train a form tapering from the centre of the train toward either end . . . to diminish atmospheric resistance."